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CONTRIBUTIONS TO THE LICHEN AND BRYOPHYTE FLORA OF ALETSCHWALD NATURE RESERVE AND ITS SURROUNDINGS (VALAIS, SWITZERLAND)

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RÉSUMÉ

Contribution à la flore lichénique et bryophytique de la réserve d'Aletsch et de ses environs (Valais, Suisse)

Ce travail constitue un inventaire de la flore des lichens et des bryophytes de la réserve d'Aletsch et de ses environs. Onze stations situées aussi bien dans la forêt qu'au-dessus de la limite supérieure de cette dernière, ainsi qu'une station se trouvant sur la

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moraine récente du grand glacier d'Aletsch ont été inventoriées. A l'exception de Mossfluo, toutes les stations font partie de l'étage oroboréal (subalpin). 2817 échantillons (1358 lichens et 1459 bryophytes) représentant respectivement 178 et 186 espèces de lichens et de mousses ont été récoltés. 53 espèces de lichens et 58 espèces de mousses sont nouvelles pour la région. La liste floristique fournit pour chaque espèce une brève description de la station.

La flore des forêts ainsi que celle des localités se situant au-dessus de la limite supérieure des arbres sont semblables. Seule la localité de Mossfluo, où nous avons récolté quelques lichens oroarctiques (alpins), se distingue des autres. La moraine récente se différencie de tous les autres milieux par la présence de quelques espèces pionnières et calcicoles. Les lichens *Bryoria pseudofuscescens* (Gyeln.) Brodo & Hawsw., *Cladonia merochlorophaea* Asah., *C. merochlorophaea* var. *novochlorophaea* Sipman ainsi qu'une race chimique (acide psoromique) de *C. symphycarpa* (Ach.) Fr. sont nouveaux pour la Suisse.

I. INTRODUCTION

The lichen flora of the Aletschwald region was previously studied by E. FREY (1937). The aim of his study was to give an account of lichens in the newly established (1933) nature reserve. Some comments on the lichens of this region are also presented by CRESPO *et al.* (1978), as well as in papers dealing with the vegetation of the area (LÜDI, 1945, 1950; RICHARD, 1968, 1974). The first bryophyte flora was published by MEYLAN (1936), who included also the bryophytes of Teiffe Wald. In connection with a field excursion of the Amicale Phytosociologique in 1976 the bryophyte vegetation mainly above timberline was studied by LECOINTE (1978). Some information can also be found in LÜDI (1945, 1950) and RICHARD (1968, 1974).

Material for this work was collected by the authors in the study area in 1982. The aim of the research was to give an account of the lichen and bryophyte flora of the Aletschwald Nature Reserve and its surroundings. Lichens include 178 species (64 genera) and bryophytes 186 species (93 genera; 53 species of lichens and 58 of bryophytes are found for the first time from the area). The lichen species *Bryoria pseudofuscescens* (Gyeln.) Brodo & Hawksw., *Cladonia merochlorophaea* Asah., *C. merochlorophaea* var. *novochlorophaea* Sipman and the psoromic acid strain of *C. symphycarpa* (Ach.) Fr. are reported as new to Switzerland. *Parmelia squarrosa*, a lichen species new to Europe was also found and is reported in HYVÖNEN (1985).

This paper represents an essential part of the authors' theses for the Master's degrees at the University of Helsinki, Finland (J. HYVÖNEN, 1984; S. HYVÖNEN, 1984).

II. THE STUDY AREA

The Aletschwald Nature Reserve is situated in the NE part of the Canton Valais in the Central Alps. The most prominent feature in the area is the presence of the Great Aletsch glacier. The nature reserve lies on a NW slope descending to the glacier.

Geologically the whole area belongs to the crystalline Aarmassif. The lateral moraines of the glacier mainly consist of silicaeous material. Only a few calcareous stones, which derive from Jungfrau in the north, can be found on the moraines (RICHARD, 1968; CRISINEL, 1978).

The climate of the area can be described as continental. It is, however, more humid than in the extremely continental parts of the Rhône valley. The mean annual precipitation is 1200 mm, the mean annual temperature +1,1°C (Riederfurka, 2040 m.s.l.) (MERCANTON, 1940; FISCHER, 1966).

According to its physiognomy the natural vegetation of the area can be roughly divided into three parts. On the moraines along the glacier a gradual succession of vegetation towards the climatic climax (*Pinus cembra - Larix decidua* forest) can be observed. In the youngest parts, the vegetation is still very sparse, mainly consisting of bryophytes and herbaceous pioneer species such as *Linaria alpina, Oxyria digyna* and *Arabis alpina.* On the 10-60 years old moraines the willows (especially *Salix helvetica*) and the young individuals of *Betula pendula* and *Larix decidua* are prominent. On the moraines older than 60 years a podsol profile is formed, and the dominance of the climax species is evident. The forest reaches its climax stage in about 100 years and depending on the situation either *Pinus cembra* or *Picea abies* will become dominant (LÜDI, 1945; RICHARD, 1968, 1974).

Coniferous oroboreal forests cover the slopes from about 1000 m to the present timberline, i.e. 2200-2230 m. Here, in the continental Alps, the lower parts of the forest (extensively dominated by *Picea abies*) are difficult to locate in the zonal system, while the upper parts down to c. 1900 m are readily classified as oroboreal (zonation after LANDOLT, 1983; terminology according to AHTI *et al.*, 1968). Above the *Picea abies* forest up to the timberline it is *Pinus cembra* and *Larix decidua* that form the upper oroboreal forests (FISCHER, 1966; RICHARD, 1968; GALLAND, 1976; ELLENBERGER, 1978).

At the present timberline large areas are covered by low dwarf-shrub heaths composed of *Empetrum hermaphroditum, Vaccinium myrtillus, Juniperus communis* ssp. *alpina, Rhododendron ferrugineum* etc. They are, in part natural but their area has been widely extended by human activities (RICHARD, 1968; ELLENBERGER, 1978).

III. MATERIAL AND METHODS

In this study a total of 1358 specimens of lichens and 1459 of bryophytes were collected. Some specimens, especially those of difficult crustose lichen groups were determined only at the generic level. The specimens are deposited in Bot. Mus. Univ. of Helsinki (H), some duplicates will be in Herb. Univ. Neuchâtel (NEU).

In the following lists all the species collected are presented in alphabetic order. All collected specimens with a short description of habitats are presented. The numbers of 11 collection sites are printed in italics. In some hepatics the specimen was too scanty to be separated as its own and the name in parentheses gives in these cases the main ingredient of the specimen involved. The collection number in parentheses indicates an uncertain determination (cf.).

Nomenclature of lichens is mainly after SANTESSON (1984) and that of bryophytes follows predominantly KOPONEN *et al.* (1977) and FRAHM & FREY (1983) with following exceptions: *Apometzgeria pubescens* (Schrank) Kuwah. and *Calypogeia azurea* Stotler & Crotz (GROLLE, 1983), *Brachythecium oedipodium* (Mitt.) Jaeg. (PIIPPO, 1983), *Mniobryum vexans* Limpr. (CORLEY *et al.*, 1982), *Racomitrium elongatum* (Ehrh.) Frisvoll (FRISVOLL, 1983) and *Warnstorfia exannulata* (B.S.G.) Loeske (TUOMIKOSKI & KOPONEN, 1979). Nomenclature of vascular plants follows WELTEN & SUTTER (1982).

No frequency estimates are given but the number of specimens cited (= collecting numbers) to some extent reflect whether the taxon is rare or common within the area.

COLLECTION SITES

The material was collected at eleven localities (Fig. 1.) that represent the most common vegetation types of the area. These sites were suggested by the MAB (Man and Biosphere) Aletsch project collaborators within the framework of their symphytosociological inventory.

A. Recent lateral moraine of the glacier.

1. NW slope, different successional stages of vegetation. Altitude 1775-1865 m.

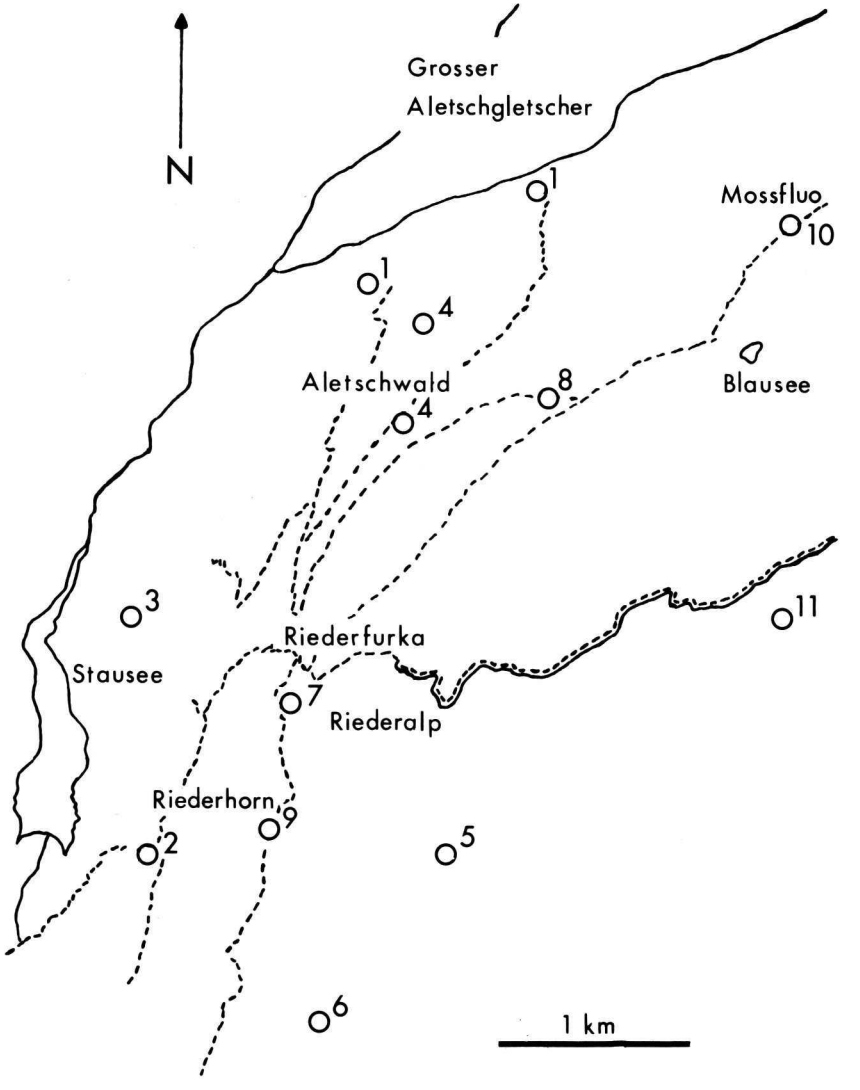

Fig. 1. Collection sites.

B. Forests.

2. W slope between Rotbrüch and Stausee, *Picea abies* forest with small logged areas. Altitude 1700-1750 m.
3. Teiffe Wald. NW slope covered by *Picea abies* forest with old forest fire areas. Altitude 1715-1790 m.
4. Aletschwald. NW slope, forest dominated by *Pinus cembra* and *Larix decidua.* Altitude 1945-2060 m.
5. SE slope covered by *Picea abies* forest, NE of Löüwizug. Altitude 1560-1815 m.
6. Riederwald. SE slope covered by *Picea abies* forest. Altitude 1840-1880 m.

C. Heath above timberline.

7. Riederfurka. A slope slightly descending to SE, a mixture of heath and pasturage. Altitude 2080-2090 m.
8. Hoflüe. NW slope covered by heath. Altitude 2150-2190 m.
9. Riederhorn. Deforested summit, mixture of stony pasturage and heath. Altitude 2215-2230 m.
10. Mossfluo. Ridge covered by heath, pasturage and boulders. Altitude 2250-2335 m.

D. Swamps

11. A small mire between Flesch and Wälligstafel. Altitude 1948 m.

IV. GENERAL FEATURES OF LICHEN AND BRYOPHYTE FLORAS

Compared with many other parts of the Alps, the lichen flora of the Aletschwald region is quite poor. Many species, such as *Cladina stellaris, Cladonia bellidiflora, C. bacillaris,* which are common in many other regions (FREY, 1952) are absent from Aletschwald. This is mainly due to four factors: monotonous bedrock, simple morphology of the ridge, special climate and vegetation. On the NW slope the snow does not melt until mid-June and the ground dries rapidly. The humidity is quite low in summer, thereby especially affecting epiphytic lichens. The field layer in the *Pinus* - *Larix* forest is well developed and often forms dense thickets so that terricolous lichens are few and mainly restricted to the vicinity of paths (also FREY, 1937).

Down in the continental Rhône valley the lichen flora is quite different, with only a few species shared with Aletschwald, e.g. *Lecanora argopholis, L. muralis* and *Physcia dubia* (BUSCHARDT, 1979).

The recent lateral moraine

The siliceous till of the recent moraine is still quite unweathered, and acid humus is lacking; therefore the pH is relatively high (LÜDI, 1945, 1950). Scattered calcareous rocks transported by the glacier can be found. These factors are responsible for the presence of some calciphilous species e.g. *Cladonia acuminata, C. symphycarpa, Preissia quadrata, Ditrichum flexicaule, Tortella tortuosa, T. inclinata, Bryum arcticum* and *B. chrysophyllum.*

Only a few crustose lichen species, such as *Rhizocarpon geographicum* coll., *Lecanora polytropa* and *Aspicilia* spp. grow on the moraine adjacent to the edge of the glacier. Mosses are typically those of open and gravely habitats, e.g. *Pogonatum urnigerum, Polytrichum piliferum, Pohlia filum* and *Racomitrium canescens.* The latter is very abundant on the whole moraine forming large gray-green patches identifiable from afar.

Where a thin humus layer has developed, the pioneer lichen species *Stereocaulon alpinum* is abundant. In sheltered crevices and at bases of boulders *Lepraria incana* and *Stereocaulon nanodes* appear, as well as the first *Cladonia* species (*C. acuminata, C. coccifera, C. symphycarpa, C. fimbriata, C. pocillum* and *C. uncialis*). Numerous small rivulets are inhabited by many hygrophilous mosses e.g. *Oncophorus virens, Bryum pseudotriquetrum, Meesia uliginosa, Philonotis tomentella, Cratoneuron commutatum* and *C. filicinum.* On older moraine with a more closed field layer, forest species like *Cladonia carneola, C. chlorophaea, Peltigera polydactyla* and *P. praetextata* can be found. *Sanionia uncinata* is a typical moss here, and species dominant in the ground layer of climax stages are still scarce (*Dicranum scoparium, Hylocomium splendens*) or absent (*Pleurozium schreberi*).

Forests

The truly terricolous flora of the forests is poor. The lichens are confined to small clearings, where they are sometimes numerous.

They grow most abundantly on boulders, mossy cliffs, rotten logs and stumps as well as on branches of trees. Bryophytes are likewise more common where the forest is not dense; only some species like *Mnium spinulosum* grow in extremely shaded conditions on needle litter of the forest floor.

The richest lichen flora in the *Picea abies* forests is found on the NW slope in Teiffe Wald. In dense spruce stands lichens are totally absent from the ground layer but in small clearings dominated by grasses and *Vaccinium myrtillus*, especially *Cladonia furcata* and *C. ecmocyna* are frequent. Along with *Parmeliopsis ambigua, Cladonia cenotea, C. coniocraea, C. fimbriata* and *C. sulphurina* are particulary characteristic on stumps and fallen logs. Species like *Cladonia carneola, C. macroceras, C. pleurota* and *Peltigera degenii* thrive among mosses which often densely cover thin ranker soil (see BUNTING, 1967) on rocks and cliffs. Numerous bare boulders and cliffs offer substrates for several crustose species, the commonest being *Rhizocarpon geographicum* coll. *Lecanora polytropa, Caloplaca arenaria, Acarospora fuscata* and *Aspicilia* spp. are abundant as well. Typical for shaded vertical to overhanging cliffs are, among others, *Lobaria scrobiculata, L. linita, Parmelia omphalodes, P. glabratula* var. *fuliginosa* and *Ochrolechia androgyna.* Many epiphytic species such as *Pseudevernia furfuracea, Evernia divaricata, Hypogymnia* spp. and *Usnea* spp. cover lower branches of *Picea abies.* Other tree species are insignificant and thereby the epiphytic lichen flora is quite monotonous.

Lower down on the slope (between Rotbrüch and Stausee) the spuce forest is more closed. The lichen flora is even more monotonous than in Teiffe Wald. In the ground layer lichens are totally lacking, being confined to the rotten logs and mossy stones of a few small clearings. *Peltigera praetextata* (abundant), *Nephroma parile* and several *Cladonia* species are present. The epiphyte lichen flora is rather similar to that of Teiffe Wald.

In the extremely shady spruce stands the field layer is poorly developed and the bryophyte cover of the ground is likewise only fragmentary. Typical species are e.g. *Plagiochila porelloides, Polytrichastrum alpinum, Mnium spinulosum, Brachythecium velutinum* and *Plagiothecium denticulatum.* Where more light is available, small shrubs dominate and bryophytes, such as *Barbilophozia hatcheri, Brachythecium starkei, Pterigynandrum filiforme* (predominantly on stones), *Dicranum scoparium, Hylocomium splendens, Pleurozium schreberi* and *Rhytidiadelphus triquetrus* can be found.

On the SE slope *Picea abies* is also dominant but the forests are drier and not as dense as those mentioned above. Of the two areas studied the one situated NE of Löüwizug (= collection site n° 5) is slightly moister. A few terricolous lichen species, most commonly *Peltigera praetextata,* are present. On several clearings dominated by *Vaccinium myrtillus* terricolous *Cetraria islandica* and *Cladonia furcata* can be found. Rotten logs are covered by *Cladonia fimbriata, C. ochrochlora, C. coniocraea* and *Lepraria incana.* On branches of trees epiphytes are conspicuous but the flora mainly consists of a few species such as *Evernia divaricata, Pseudevernia furfuracea, Hypogymnia physodes* and *Bryoria capillaris.* The humid microclimate under tall herbs in small clearings enables the dominance of bryophytes like *Plagiochila asplenioides, Plagiomnium affine* and especially *Rhytidiadelphus triquetrus.* In drier Riderwald *Cladonia chlorophaea, C. fimbriata* and *C. pyxidata* are the most common lichen species growing on the ground. In addition, *C. subulata, Nephroma parile* and *Peltigera rufescens* can be found on the ranker soil of mossy cliffs. In regard to bryophytes, Riederwald differs from other *Picea* forests in that species which are abundant elsewhere (*Hylocomium splendens, Pleurozium schreberi* and *Rhytidiadelphus triquetrus*) are rare or totally lacking.

Of all the lichen species, *Cetraria hepatizon, Evernia divaricata, Peltigera canina* and *P. degenii* are fully confined to the spruce forests. Some of the mosses found only or predominantly in the lower spruce forests can be classified as temperate – southern boreal, according to their general distribution (KOPONEN, 1979). These are *Grimmia ovalis, G. muehlenbeckii, Mnium stellare, Plagiomnium affine, Isothecium alopecuroides, Cirriphyllum piliferum* and *Plagiothecium curvifolium.*

The diversity of the habitats available in the *Pinus-Larix* forests higher up on the slope is greater and accordingly the lichen flora seems to be richer than in the spruce forests. Under *Rhododendron ferrugineum* terricolous species are sparse but on exposed dry hummocks, covered by low scrub, *Cladonia* species are numerous. Of these especially *C. macroceras* is especially abundant. In contrast to the spruce forests *Peltigera* spp. are scarce. *Brachythecium salebrosum* is nearly limited to places where *Calamagrostis villosa* dominates the field layer. It is here accompanied by *Brachythecium starkei* and *B. velutinum.*

Other species are almost totally restricted to stumps, boulders and bare mineral soil uncovered by fallen stumps. The lichen flora on rotten logs and stumps is very similar to that of the other forests. Epiphytes consist of several *Usnea* and *Bryoria* species. Particulary striking are large bright yellow patches of *Letharia vulpina* which is almost absent from other forests. Several cliffs and stony ruins of old aqueducts offer special substrates for many saxicolous species such as *Caloplaca obliterans, Chrysothrix chlorina* and *Pertusaria isidioides* which are present only in Aletschwald.

Scrub above timberline

In the Alps, timberline has been extensively lowered by human activities (ELLENBERGER, 1978). In the Aletsch region only the uppermost parts of Mossfluo reach the zone of the oroarctic (alpine) scrub. Physiognomically similar treeless vegetation on lower slopes actually belong to the upper oroboreal zone. All the areas studied are under heavy disturbance by tourism and grazing.

As mentioned above, the vegetation near the present timberline is a mixture of pasturage and small hummocks covered by scrub. The composition of the ground layer is clearly determined by the exposure of the habitat. On the south sides and uppermost parts of the hummocks the field layer is sparse. These exposed places are dominated by the lichens *Cladina rangiferina, C. mitis, Cladonia pyxidata, C. fimbriata, C. carneola* and *Cetraria islandica.* Dominant bryophytes are *Polytrichum piliferum, P. juniperinum, Racomitrium canescens, Dicranum scoparium* and *Desmatodon latifolius.* Influence of the tourism and grazing is also seen in the abundance of many ruderal species like *Ceratodon purpureus, Schistidium aporcarpum, Bryum argenteum, B. caespiticium* and *Pohlia nutans.* These are concentrated on exposed humus by the paths. The sheltered sides of the scrub hummocks can be fairly humid. Common species on these shady habitats are *Peltigera aphthosa, P. praetextata, Cladonia pleurota* and *C. furcata.* Also *Rhytidiadelphus triquetrus,* which is more typical in mesic spruce forests, can be found. Dominant mosses under scrub are those which are abundant also in the forests, e.g. *Dicranum scoparium, Hylocomium splendens* and *Pleurozium schreberi.* They are accompanied by *Dicranum muehlenbeckii, D. fuscescens, Brachythecium reflexum, Hylocomium pyrenaicum* as well as

by the hepatics *Barbilophozia floerkei, B. hatcheri, B. lycopodioides* and *Lophozia ventricosa. Brachythecium salebrosum* and *B. albicans* are confined to the areas covered by pasturage. On Riederfurka the hollows between scrub hummocks can be exceptionally wet, and species like *Aulacomnium palustre, Sphagnum compactum, S. nemoreum, Sanionia uncinata, Hylocomium pyrenaicum* and *Brachythecium* spp. can be found.

Almost the only epiphytic lichen is *Cetraria pinastri,* which grows on twigs of *Juniperus.* Stones and cliffs are extensively covered by *Hypogymnia intestiniformis, Aspicilia* spp., *Rhizocarpon* spp. and *Lecanora* spp.

Mossfluo is the only collection site reaching the true oroarctic (alpine) zone. Its lower parts do not significally differ from other sites above the present timberline. On the higher portions of the ridge are large boulders and vertical cliffs with deep clefts. The saxicolous lichen flora is relatively rich, including species such as *Huilia macrocarpa, Caloplaca arenaria, Hypogymnia atrofusca, Tephromela atra,* many *Umbilicaria* species as well as the ornithocoprophilous (WIRTH, 1980) *Xanthoria elegans, X. candelaria, Physcia caesia, P. dubia* and *Ramalina capitata.*

Above 2300 m a clear difference in the terricolous lichen flora can be observed. The appearance of oroarctic species like *Thamnolia vermicularis* (sparsely present also on Riederhorn), *Cetraria cucullata, C. ericetorum* and *C. nivalis* is significant. *Cladonia phyllophora* is also common. Of the species found above the timberline, 11 are classified as essentially oroarctic (POELT, 1969; WIRTH, 1980). Further examples are *Dimelaena oreina, Alectoria ochroleuca, Caloplaca tiroliensis* and *Hypogymnia atrofusca.* Some species which appear only above the timberline are probably restricted by lack of suitable substrates.

11 species of bryophytes in the scrub areas can be classified according to their general distribution to represent the north boreal-arctic element: *Marsupella sparsifolia* (SCHUSTER, 1958), *Gymnomitrion coralloides* (SCHOFIELD, 1969), *Oligotrichum hercynicum, Kiaeria starkei, Tortula norvegica, Lescuraea radiosa, L. saxicola, Brachythecium collinum* (TUOMIKOSKI, 1939), *Grimmia sessitana, Mniobryum vexans, Brachythecium glaciale* (NYHOLM, 1969) *Lescuraea mutabilis* (AMANN, 1912). According to the latter all these species can be found also in the oroboreal (subalpine) zone in the Swiss Alps – only *Kiaeria starkei* was classified as truly arctic-oroarctic (alpine).

Swamps

The small swamp in the village of Goppisberg is surrounded by slopes covered with pasturage. It is situated near Flesch at the altitude of 1948 m. Some vascular plants, rare in Canton Valais, have been collected at the site (BÉGUIN and THEURILLAT, 1981).

The margin, with a well developed field layer of tall *Carex* spp., is relatively dry. Small hummocks are covered with scrub (*Calluna vulgaris, Vaccinium myrtillus, V. uliginosum* and *Potentilla palustris*). Bryophytes like *Polytrichum commune, Aulacomnium palustre* and *Brachythecium oedipodium* can be found. Typical species of the genus *Sphagnum* are *S. centrale, S. nemoreum, S. magellanicum* and *S. angustifolium.* The two latter grow abundantly also in wet hollows between the hummocks, and *S. angustifolium* is the dominant species of the swamp margin. It can also be found in the wet center along with the dominant *S. subsecundum.* In addition to *Sphagnum* spp. only *Calliergon stramineum* was collected on wet surfaces.

Low depressions in Aletschwald contain small wet swamps, and these are interconnected by small streams. Bryophytes like *Rhizomnium magnifolium, R. pseudopunctatum, Philonotis seriata, Warnstorfia exannulata* and *Anisothecium palustre* indicate the mesotrophy of the brook margins. The ground layer of the actual swamp is dominated by *Sphagnum platyphyllum, S. russowii, S. centrale* and *S. warnstorfii,* the latter one being typical for mesotrophic swamps.

Different substrates

Dominant terricolous bryophytes were treated above mainly in connection with different habitats; but there are also many less important species with a restricted occurrence. Several *Pohlia* and *Bryum* species are pioneers on bare mineral soil. Also *Dicranella subulata* and *Oligotrichum hercynicum* were collected on bare ground. *Pohlia elongata* and *Schistostega pennata* find suitable conditions on mineral soil uncovered by fallen logs, still sheltered by the roots of the dead trunk.

Especially in forests, the upper layers of vegetation are so well developed that the growth of terricolous lichens is suppressed. Thus most species are concentrated on other substrates and can be found only incidentally on the ground. The primarily terricolous species

are *Cetraria islandica, Cladina* spp., *Cladonia ecmocyna, C. macroceras, C. furcata, C. macrophyllodes, Trapeliopsis granulosa* and *Stereocaulon alpinum* (the latter is abundant on thin humus and till of the recent lateral moraine).

The lichen vegetation on rocks is conspicuous and relatively well developed especially above timberline. Saxicolous bryophytes of scrub areas are quite similar to those observed in forests. On exposed, sunny boulders and cliffs the common lichen species include *Acarospora fuscata, Rhizocarpon geographicum* coll., *Umbilicaria cylindrica* (most frequent above timberline), *U. deusta, Lecanora polytropa, L. muralis* and numerous *Aspicilia* species. Typical mosses of the habitat are *Ceratodon purpureus, Grimmia sessitana* and *Polytrichum piliferum. Racomitrium canescens, Dicranoweisia crispula, Dicranum scoparium* and *Lescuraea incurvata* occur here as well but they are also found on more shaded cliffs and boulders.

Small stony stream beds filled with water of melting snow in spring continue to be humid habitats still in summer. On moist stones grow the lichens *Porpidia macrocarpa, P. tuberculosa, Protoparmelia badia,* and *Lecanora intricata.* Common bryophytes collected on humid and moist boulders and cliffs are *Barbilophozia hatcheri, Radula complanata, Polytrichastrum alpinum, Grimmia hartmanii, Racomitrium sudeticum, Paraleucobryum longifolium, Heterocladium dimorphum, Sanionia uncinata, Brachythecium starkei* and *Pterigynandrum filiforme.* Many of these bryophytes can not be classified as exclusively saxicolous for they are growing on other substrates as well. Overhanging, shady and moist cliffs in forests offer special substrates for *Parmelia omphalodes, P. glabratula* var. *fuliginosa* and *Lepraria* spp. More rare species such as *Chrysothrix chlorina, Caloplaca obliterans, Lobaria scrobiculata, Parmelia squarrosa* and *Pertusaria* spp. also occur here. Bryophytes restricted to the vertical cliffs are *Anastrophyllum minutum, Blindia acuta, Grimmia torquata, Cynodontium polycarpon, C. gracilescens, Pohlia longicollis* and *Bartramia halleriana.* At the base of the rock faces, some calciphilous species like *Apometzgeria pubescens, Lophocolea minor, Distichium capillaceum, Tortula ruralis* and *Timmia austriaca* are found. True calciphilous, saxicolous mosses (*Distischium capillaceum, Ditrichum flexicaule, Schistidium apocarpum* and *Tortella inclinata)* grow on the lateral moraine.

Corticolous vegetation is not very luxuriant. The tree species are few; broad-leaved trees (e.g. *Alnus viridis* and *Sorbus aucuparia*) are

of minor importance as substrates. Yet there are some lichen species restricted to their bark: *Lecanora cinereofusca, L. chlarotera, L. carpinea, L. umbrina, Caloplaca cerina* and *Lecidella euphorea.* The lichen flora on conifers is quite homogenous. In spruce forests the number of epiphytic lichens is greatest. As epiphytes, growing only on *Picea* are *Evernia divaricata, Parmelia glabratula* var. *glabratula, Scoliciosporum chlorococcum, Usnea filipendula* and *U. hirta.* Common species on bark of *Picea* as well as on *Pinus cembra* or *Larix decidua* include *Bryoria capillaris, B. fuscescens, Cetraria chlorophylla, Pseudevernia furfuracea, Hypogymnia physodes* and several species of *Usnea.* Species restricted only to *Larix* are *Lecanora subintricata* and *Cyphelium tigillare,* while *C. inquinans* and *Calicium viride* are only found on *Pinus.* Bright yellow patches of *Letharia vulpina* grow both on *Larix* and *Pinus. Juniperus* offers a suitable substrate for only two less important species *Cetraria pinastri* and *Parmeliopsis ambigua.*

Of the bryophytes collected on bark of living trees only *Radula complanata* coll. may be classified as truly epiphytic. Other species like *Lophozia incisa, Sanionia uncinata* and *Brachythecium reflexum* grow on other substrates as well. Accidentally also other species mainly growing on stones and on the ground, may occasionally cover the roots and horizontal parts of the stems.

Especially in forests on the NW slope fallen logs and rotten stumps are abundant, and these may be totally covered by several lichens and bryophytes. Hepatics like *Lophozia longiflora* and *Ptilidium pulcherrinum* as well as the mosses *Tetraphis pellucida, Orthodicranum tauricum, O. montanum* and *O. flagellare* were collected only on rotten wood. The flora consists of many species growing abundantly also on other substrates. These include e.g. hepatics *Lophozia ventricosa, Lepidozia reptans, Blepharostoma trichophyllum* and mosses *Pohlia nutans, Heterocladium dimorphum, Sanionia uncinata,* several *Brachythecium* spp., *Plagiothecium* spp. and *Hypnum cupressiforme. Dicranum scoparium* is in many cases the major constituent of the plant cover on rotten logs. Dominant lignicolous lichen species include *Cladonia cenotea, C. coniocraea, C. ochrochlora, C. sulphurina, C. digitata, C. macilenta, Parmeliopsis ambigua* and *P. hyperopta.*

List of lichen species

Acarospora

chlorophana (Wahlenb.) Massal.: *10.* 937. On an overhanging NW cliff.
fuscata (Nyl.) Arn.: *3.* 517, 522; *7.* 302, 345, 352; *9.* 111, 125, 134, 148, 203; *11.* 739. On sunny rocks.
spp.: eight specimens. On sunny, shady and wet rocks.

Alectoria

ochroleuca (Hoffm.) Massal.: *10.* 905. Only in the uppermost parts (2310 m), on humus.

Arthrorhaphis

citrinella (Ach.) Poelt: *4.* 1404; *10.* 923. On ranker soil and a moist, shady cliff.

Aspicilia

cinerea (L.) Koerb.: *5.* 1253, 1277; *10.* 934. Both sunny and shady cliffs.
spp.: 48 specimens. On boulders and cliffs.

Baeomyces

roseus Pers.: *10.* 857. In a sunny depression, on humus.
rufus (Huds.) Rebent.: *1.* 1039: *3.* 484; *8.* 955. On moist sand in rock fissures.

Bryoria

capillaris (Ach.) Brodo & Hawksw.: *2.* 1166, 1196; *3.* 459, 463; *4.* 562, 603, 636, 1367; *5.* 1235, 1245, 1286, 1291, 1309; *6.* 1068, 1080, 1111. Most commonly on *Picea abies;* also on *Pinus cembra* and *Larix decidua.*
chalybeiformis auct.: *10.* 901. On a sunny cliff.
fuscescens (Gyeln.) Brodo & Hawksw.: *2.* 1168; *3.* 454, 534; *4.* 558, 563, 573, 578, 633, 636, 716, 1382, 1384, 1392; *9.* 193; *10.* 891. Especially on branches of *Picea* but also on *Larix* and *Pinus;* once seen on a rock-wall.
pseudofuscescens (Gyeln.) Brodo & Hawsw. (see BRODO & HAWKSWORTH, 1977). *4.* 578, 1383; *6.* 1970. On branches of *Picea, Pinus* and *Larix.* Contains norstictic, and connorstictic acids (studied by thin-layer chromatography, see CULBERSON, 1972) and can thereby be distinguished from related species. *B. pseudofuscescens* grows normally on conifers in mountain-forests. It has been recorded both from east and west coasts of North America; in Europe it has been found at least in N.W. Russia, Norway and Scotland. The species is new to Switzerland.

Buellia

punctata (Hoffm.) Massal.: *10.* 773a, 1456. On *Lecidea granulosa.*
spp.: seven specimens. On bark of *Pinus* and *Larix.*

Calicium

viride Pers.: *4.* 594. On branches of *Pinus cembra.*

Caloplaca

arenaria (Pers.) Müll. Arg.: *3.* 477, 479, 480; *7.* 311; *9.* 130, 131, 144, 147; *10.* 862. On rock exposed to the sun.

cerina (Hedw.) Th. Fr.: *3.* 503, 505, 506, 1445; *4.* 718; *10.* 863. On *Sorbus aucuparia* and *Salix;* also on an exposed rock-wall.

obliterans (Nyl.) Blomb. & Forss.: *4.* 663, 665. On a shady, moist, overhanging cliff.

tiroliensis Zahlbr.: *10.* 775. On ranker soil.

sp.: one specimen. On a sunny cliff.

Candelariella

vitellina (Hoffm.) Müll. Arg.: *3.* 478; *7.* 298, 360; *9.* 147, 162; *10.* 733, 781, 807. Saxicolous, noted also on humus.

xanthostigma (Ach.) Lettau: *9.* 240. On trunk of *Picea abies.*

spp.: eight specimens. On bare or mossy cliffs, on branches of *Juniperus.*

Cetraria

chlorophylla (Willd.) Vain.: *2.* 1194; *3.* 537; *4.* 596, 604, 606, 642, 1380; *5.* 1240; *9.* 198. On bark of conifers. Widespread but relatively rare in the mountain-forests of the Alps (FREY, 1959).

cucullata (Bell.) Ach.: *10.* 767, 794, 833. In the uppermost parts of the site; on humus of exposed hummocks, together with *C. ericetorum* and *Cladonia macroceras;* oroarctic.

ericetorum Opiz: *10.* 757, 834, 909. On humus of hummocks (both on exposed and sheltered sides).

hepatizon (Ach.) Vain. *4.* 1419; *6.* 1092. On sunny rock-walls.

islandica (L.) Ach.: *3.* 547; *4.* 685, 686, 706, 1322, 1438; *5.* 1298; *6.* 1125; *7.* 275, 291, 312, 318, 382; *8.* 963; *9.* 155, 177, 215, 220, 249; *10.* 744, 830, 850, 910. Especially on ranker soil; also in moister habitats under scrub and among mosses.

nivalis (L.) Ach.: *10.* 772. Only in the uppermost parts of the site (2335 m), on exposed ranker soil; oroarctic.

pinastri (Scop.) S.F. Gray: *2.* 1158; *3.* 509; *4.* 587, 643, 646; *5.* 1306; *6.* 1115; *7.* 310, 369; *9.* 145, 166, 168, 173, 178, 179, 180; *10.* 763, 765, 835, 907. Above timberline on *Juniperus,* more rarely also on humus and on rock; In forests it prefers moister habitats, like mossy trunks of conifers, rotten mossy logs and stumps.

Chrysothrix

chlorina (Ach.) Laundon: *4.* 1422. On a moist, overhanging boulder together with *Parmelia omphalodes* ssp. *pinnatifida* and *Lepraria membranacea.*

Cladina

arbuscula (Wallr.) Hale & W. Culb.: *4.* 687, 705, 1420; *6.* 1133; *8.* 953, 960, 967; *10.* 761, 832, 854, 930. On exposed, mossy cliffs and humus.

mitis (Sandst.) Hustich: *1.* 1037; *3.* 468; *4.* 1343, 1359, 1415; *6.* 1128; *7.* 268, 305, 339, 364, 372, 385, 388; *8.* 962; *9.* 139, 174, 183, 201, 227; *10.* 742, 751, 851, 870, 911. On humus of cliffs and hummocks.

rangiferina (L.) Nyl.: *4.* 712, 1350, 1355, 1410, 1416; *7.* 267, 279, 306, 307, 323, 366, 377, 391; *8.* 954, 965; *10.* 745, 790, 853. On humus of mossy hummocks.

Cladonia

acuminata (Ach.) Norrl.: *1.* 993, 1027. Only on the recent lateral moraine; on moist to wet humus together with *Sanionia uncinata* and *Dicranum scoparium.* According to AHTI (1977) *Cladonia acuminata* is a rare, calciphilous species.

carneola (Fr.) Fr.: *1.* 1024, 1029; *2.* 1175, 1209; *3.* 392, 404, 438, 440, 469, 483; *4.* 566, 584, 588, 591, 690, 694, 698, 1326, 1344, 1349, 1352, 1439; *6.* 1046, 1122, 1132; *7.* 280, 328, 332, 378; *8.* 955, 958; *9.* 161, 200; *10.* 866. On ranker soil, exposed hummocks, sandy soil as well as on fallen, rotten logs and stumps.

cenotea (Ach.) Schaer.: *2.* 1186; *3.* 402, 435, 447, 490, 512, 539, 1332, 1336, 1349, 1360, 1406; *6.* 1131; *9.* 186. Shady, rotten logs and stumps, often also on ranker soil.

chlorophaea (Sommerf.) Spreng.: *1.* 985, 1021; *2.* 1173; *3.* 401, 403, 406, 424, 428; *4.* 619, 621, 1323, 1326, 1332, 1356, 1373, 1411; *5.* 1280; *6.* 1047, 1056, 1074, 1110, 1127, 1142, 1145, 1146; *7.* 309, 315; *9.* 115, 117, 224; *10.* 800, 808. On ranker soil, hummocks and rotten logs and stumps.

coccifera (L.) Willd.: *1.* 999; *4.* 567; *6.* 1088, 1096; *7.* 293, 386; *10.* 749, 797. On ranker soil and hummocks, sometimes also on sandy soil and on mosses. All the specimens contain barbatic acid and thus belong to *C. coccifera* in the traditional sense, i.e. the chemical strain I (KROG *et al.,* 1980; ASPERGES, 1983).

coniocraea auct.: *2.* 1171, 1209; *3.* 402, 431, 440, 447, 541, 542; *4.* 576, 1247; *6.* 1074, 1119. Only in forests, in mesic habitats; on mosses, ranker soil and rotten logs and stumps.

cornuta (L.) Hoffm.: *3.* 447; *4.* 564, 650, 684, 1339; *9.* 159. On ranker soil and rotten stumps.

crispata (Ach.) Flot. var. *cetrariiformis* (Del.) Vain.: *7.* 326, 327, 381. On humus under scrub.

var. *crispata: 10.* 924, 925. On sunny humus in rock fissures.

cryptochlorophaea Asah.: *4.* 713. 1324; *7.* 383. On humus under scrub. Contains cryptochlorophaeic acid, paludosic acid and fumarprotocetraric acid-complex.

deformis (L.) Hoffm.: *4.* 1370, 1372; *6.* 1048. On mosses, humus and rotten wood.

digitata (L.) Hoffm.: *3.* 489, 500; *4.* 566, 577, 644, 1332, 1398. On rotten, mossy stumps and logs; noted also on trunk and on ranker soil.

ecmocyna Leight.: *2.* 1190; *3.* 429, 545; *4.* 564, 691, 703, 709, 710, 727, 1320, 1325, 1329, 1340, 1341; *7.* 269, 272, 283, 374, 379, 390; *9.* 210, 214; *10.* 750, 758, 819, 906, 920, 946, 950. On humus, more rarely on rotten stumps.

fimbriata (L.) Fr.: *1.* 984, 989, 1034; *2.* 1170, 1172, 1181, 1187, 1205, 1217, 1218; *3.* 440; *4.* 571, 583, 590, 616, 1320; *5.* 1233, 1238, 1239, 1249, 1282, 1283, 1290, 1296, 1300, 1313; *6.* 1053, 1057, 1120; *7.* 266, 274, 278, 308, 309, 317, 322, 329, 337, 373, 380; *9.* 120, 122, 123, 124, 146, 172, 207, 217, 223; *10.* 918. Abundant; on ranker soil, sunny hummocks, mosses along paths, sandy soil and rotten wood.

furcata (Huds.) Schrad.: *2.* 1200; *3.* 430, 445, 446, 486; *4.* 620, 1421; *5.* 1281, 1299, 1304; *6.* 1063, 1123, 1130; *7.* 270. In forests, especially in humid habitats; on humus under scrub, mossy boulders and cliffs, sometimes also on rotten stumps.

grayi Sandst.: *4.* 672, 704, 1330, 1361. On ranker soil and mosses. Contains grayanic acid.

macilenta Hoffm.: *4.* 585. On a rotten, mossy log of *Larix.*

macroceras (Del.) Ahti (see AHTI, 1980): *3.* 457, 485, 529, 545; *4.* 569, 692, 702, 703, 709, 1342, 1351, 1354; *7.* 271, 276, 284, 287, 314, 324, 365, 371; *8.* 957, 961, 966; *9.* 158, 173, 175; *10.* 748, 750, 756, 760, 771, 773, 791, 818, 852, 868, 913, 914, 932. On humus, on exposed and more sheltered habitats.

macrophyllodes Nyl.: *1.* 1008; *4.* 548, 567, 688; *5.* 1303; *6.* 1084, 1124; *7.* 273, 384; *9.* 121, 124, 213, 226; *10.* 753, 936. On ranker soil, mosses and more rarely also on rotten wood. Common in the Central Alps (AHTI, 1977).

merochlorophaea Asah. var. *merochlorophaea: 7.* 316, 338; *10.* 801. On humus of exposed hummocks and cliffs. Contains merochlorophaeic and 4-0-methylcryptolorophaeic acids (also fumarprotocetraric in one specimen). The species is new to Switzerland; the nearest records are in Tirol, Austria (LEUCKERT *et al.,* 1971).

var. *novochlorophaea* Sipman: *5.* 1302. On humus under scrub. Contains homosekikaic and sekikaic acids; morphologically indistinguishable from var. *merochlorophaea* (HOLIEN and TØNSBERG, 1985). The variety is new to Switzerland; the nearest record is in Schwarzwald, West Germany (LEUCKERT *et al.,* 1971).

ochrochlora Flk.: *2.* 1181, 1183, 1186, 1214; *3.* 398, 432, 502, 524, 544; *4.* 584; *5.* 1284. In forests, in moist, shady habitats; on rotten logs and stumps, more rarely on humus.

phyllophora Hoffm.: *3.* 442; *4.* 618, 693, 1346, 1357; *7.* 340; *10.* 754, 776, 789, 798, 813, 921, 928. On exposed hummocks and ranker soil, occasionally also on rotten wood.

pleurota (Flk.) Schaer.: *2.* 1186; *3.* 426, 433, 434, 487, 488; *4.* 591, 671, 701, 728, 1321, 1337, 1345, 1363, 1369, 1403, 1408, 1440; *6.* 1049, 1052, 1073, 1145; *7.* 265, 282, 330, 367; *9.* 118, 211, 228; *10.* 755, 759, 922. On humus of hummocks and along paths, on ranker soil, mosses as well as on fallen rotten logs. All the specimens contain zeorin and many also porphyrilic acid. Most of them are distinctly sorediate. However, a few specimens may belong to the so-called zeorin strain of *C. coccifera* (KROG *et al.,* 1980), which is recognized as a distinct species with very coarse soredia by ASPERGES (1983).

pocillum (Ach.) O.-J. Rich.: *1.* 995, 1026; *10.* 865. On humus. A calciphilous species (AHTI, 1977).

pyxidata (L.) Hoffm.: *1.* 975, 978, 988, 990, 992, 997, 1004, 1010; *2.* 1174, 1187, 1207; *3.* 395, 397, 440, 444, 491, 527, 530, 540; *4.* 568, 570, 571, 607, 621, 654, 661, 670, 683, 694, 1338; *5.* 1250, 1265, 1267, 1279, 1313; *6.* 1050, 1051, 1055, 1087, 1089, 1097, 1129, 1141, 1145; *7.* 285, 349, 389; *9.* 116, 141, 142, 172, 199, 225; *10.* 749, 793, 799, 802, 867, 912, 917. Both in dry and wet habitats; on humus, mosses, sandy soil and rotten wood.

squamosa (Scop.) Hoffm. var. *squamosa: 3.* 543; *4.* 549, 565; *7.* 333; *10.* 743. On humus, mosses and rotten stumps.

subulata (L.) Wigg.; *2.* 1184, 1210; *4.* 617; *5.* 1251, 1270; *6.* 1072, 1086, 1089, 1094, 1135, 1147; *7.* 281, 286, 370. On hummocks, ranker soil, mosses and rotten wood.

sulphurina (Michx.) Fr.: *3.* 405, 437, 441, 510; *4.* 647, 689, 707, 708, 729, 1331, 1332, 1335, 1348, 1353, 1371, 1437; *10.* 915. On humus as well as on rotten logs and stumps.

symphycarpa (Ach.) Fr. *1.* 974; *10.* 865*. Only on the recent lateral moraine; on humus. Widespread in Switzerland; a calciphilous and pioneer species (FREY, 1959). Contains atranorin, norstictic and connorstictic acids. The specimen marked with the asterisk contains psoromic and conpsoromic acids as well as atranorin and was collected only in the uppermost parts of the area, on humus. KRISTINSSON (1974) separates the psoromic acid race of *C. symphycarpa* as *C. dahliana* Krist. which has not earlier been recorded from the Alps; it has been found in Iceland, Greenland and Baffin Island as well as in Mongolia (AHTI, 1976), Michigan and Montana (McCUNE, 1984).

uncialis (L.) Wigg.: *1.* 1006; *10.* 752, 762, 908. In open habitats, on sunny humus.

Coelocaulon

muricatum (Ach.) Laundon (see LAUNDON, 1984): *10.* 746, 770, 796, 926. On humus of exposed hummocks and cliffs.

Cornicularia

normoerica (Gunn.) Du Rietz: *6.* 1098; *10.* 875, 938. On both exposed and sheltered rock-walls.

Cyphelium

inquinans (Sm.) Trevis.: *4.* 1375. On branches of *Pinus cembra.* The species has declined in Europe in consequence of modern forestry (POELT & VEZDA, 1977).

tigillare (Ach.) Ach.: *3.* 533; *4.* 714. On trunk of *Larix* and *Pinus.*

Cystocoleus

ebeneus (Dillw.) Thwaites: *3.* 416. On a moist, shady, overhanging cliff.

Dimelaena

oreina (Ach.) Norm.: *10.* 881, 884. Only in the uppermost parts (2310 m), on a sunny rock-wall.

Diploschistes

scruposus (Schreb.) Norm.: *3.* 422; *6.* 1092, 1102; *10.* 927. On cliff.

Epilichen

scabrosus (Ach.) Hafellner: *1.* 1040. Only on the recent lateral moraine; with *Baeomyces rufus* (most likely as a parasite, see WIRTH, 1980).

Evernia

divaricata (L.) Ach.: *2.* 1192; *3.* 456, 465; *5.* 1226, 1236, 1297; *6.* 1109. On branches of *Picea* in shady spruce stands, more rarely on rotten stumps.

Haematomma

ventosum (L.) Massal.: *3.* 525; *10.* 941. On rock-walls.

Hypocenomyce

scalaris (Ach.) Choisy: *3.* 532; *4.* 600. 602, 1389, 1390. On trunk of *Larix decidua.*

Hypogymnia

atrofusca (Schaer.) Räs.: *7.* 302; *9.* 167; *10.* 875, 878. Only above timberline; on exposed cliffs.

bitteri (Lynge) Ahti: *4.* 581, 1368, 1381, 1430. Only in the *Larix-Pinus* forest; on bark of conifers, noted also on an overhanging cliff.

farinacea Zopf (syn. *H. bitteriana* Räs., see AHTI et al., 1986). *3.* 451, 493; *4.* 636, 637, 1376, 1377; *6.* 1077. On branches of *Picea,* more rarely on *Pinus.*

intestiniformis (Will.) Räs.: *4.* 625, 1413, 1418; *9.* 149, 153, 164, 251; *10.* 779, 877. Above and at the timberline; on cliffs.

physodes (L.) Nyl.: *2.* 1152, 1163; *3.* 464, 495; *4.* 556, 640, 1364; *5.* 1223, 1229, 1294; *6.* 1067, 1079, 1134; *9.* 191, 192. Especially on *Picea,* noted also on *Larix,* rotten stumps and cliffs.

tubulosa (Schaer.) Havaas: *2.* 1151, 1182; *3.* 460; *4.* 632, 641, 1397. On bark of conifers.

Icmadophila

ericetorum (L.) Zahlbr.: *4.* 726. On ranker soil.

Lecanora

argopholis (Ach.) Ach.: *7.* 353. On rock exposed to the sun. The species has been commonly confused with *L. frustulosa* (Dickson) Ach. from which it can readily be distinguished by chemical features (see VÄNSKÄ, 1984).

carpinea (L.) Vain.: *3.* 504. On branches of *Sorbus aucuparia.*

cenisia Ach.: *4.* 1452; *5.* 1258; *6.* 1061; *7.* 289, 296, 354; *9.* 112, 119, 242, 255; *10.* 828. On both exposed and sheltered cliffs and rock-walls.

chlarotera Nyl.: *3.* 1445. On branches of *Sorbus aucuparia.*

circumborealis Brodo & Vitik. (see BRODO and VITIKAINEN, 1984). *3.* 1442, 1443, 1444, 1446; *4.* 592, 593, 604, 635, 638, 1316, 1365, 1374, 1375, 1395, 1396, 1448, 1449; *5.* 1305; *6.* 1066; *9.* 188. On bark of conifers.

expallens Ach.: *3.* 1443. On branches of *Picea.*

intricata (Ach.) Ach.: *4.* 610, 611, 1436; *5.* 1274; *9.* 246; *10.* 842. Saxicolous.

mughicola Nyl. (see WIRTH, 1980). *4.* 715. On *Pinus cembra.*

muralis (Schreb.) Rabenh.: *1.* 1017; *4.* 627; *5.* 1252, 1256, 1262; *6.* 1099, 1101, 1102; *7.* 299, 301, 347, 348, 351, 353; *10.* 787, 874. Especially on cliffs in sun.

polytropa (Hoffm.) Rabenh.: *1.* 982, 1045; *3.* 471, 472, 473, 474, 478, 519, 522; *4.* 612; *5.* 1252, 1253; *6.* 1060; *7.* 298, 304, 335, 342; *9.* 108, 110, 113, 137, 138, 143, 168, 205, 235, 241, 245; *10.* 845. Saxicolous, especially in sunny places.

pulicaris (Pers.) Ach.: *3.* 1445. On branches of *Sorbus aucuparia.*

rupicola (L.) Zahlbr.: *5.* 1257, 1259; *7.* 295; *10.* 945. On cliffs.

salicicola H. Magn. (see BRODO, 1984). *3.* 1447; *4.* 717b. On *Rhododendron ferrugineum* and *Alnus viridis.*

subintricata (Nyl.) Th. Fr.: *4.* 554, 1395. On branches of *Larix decidua.*

symmicta (Ach.) Ach. *4.* 718. On *Salix.*

umbrina (Ach.) Massal.: *3.* 503, 505, 506. On branches of *Sorbus aucuparia.*
varia (Hoffm.) Ach.: *4.* 714, 1316, 1374, 1375, 1396. Corticolous.
spp.: seven specimens. Both on branches and on cliffs.

Lecidea

atrobrunnea (DC.) Schaer.: *99.* 140, 163. On a sunny cliff, and on humus.
demissa (Rutstr.) Ach.: *10.* 929. On y sunny cliff.
sarcogynoides Koerb.: *7.* 361. On a rock-wall.
spp. (s. lat.): 17 specimens. Saxicolous, corticolous and lignicolous.

Lecidella

euphorea (Flk.) Hertel: *3.* 503, 505; *4.* 554. On branches of *Sorbus* and *Larix.*
sp.: one specimen. On branches of *Juniperus.*

Lepraria

incana (L.) Ach.: *1.* 976, 1022, 1033; *2.* 1185; *3.* 409, 462; *4.* 550, 1429; *5.* 1225, 1230, 1253, 1310; *6.* 1117; *9.* 277. Most commonly in sheltered habitats, on overhanging cliffs, trunk of *Picea* and rotten wood.
membranacea auct.: *4.* 653, 657, 676, 677, 1425, 1428, 1431. On shady vertical to oververtical cliffs and boulders.
neglecta Vain.: *3.* 427; *4.* 676, 1328; *6.* 1093, 1101, 1121; *9.* 126; *10.* 856. On cliffs and overhanging rock-walls, rarely on humus.
spp.: two specimens. On mosses.

Letharia

vulpina (L.) Hue: *2.* 1193; *3.* 536; *4.* 572, 600, 714, 1385, 1388, 1389. On bark of *Larix* and *Pinus.* Abundant in the *Larix-Pinus* forest.

Lobaria

linita (Ach.) Rabenh.: *3.* 399, 449; *10.* 809, 812, 820, 919. On shady, moist rock-walls and mosses; rarely on sunny cliffs.
scrobiculata (Scop.) DC.: *3.* 417, 420. On a shady, overhanging rock-wall.

Nephroma

bellum (Spreng.) Tuck.: *9.* 171, 208. In a fissure of a cliff and on a dead branch of *Juniperus.*
parile (Ach.) Ach.: *2.* 1176, 1215; *3.* 393; *6.* 1064, 1143; *9.* 171, 189, 219, 229. On ranker soil and on mosses on rock-walls.

Ochrolechia

alboflavescens (Wulf.) Zahlbr.: *3.* 496; *4.* 579, 638; *5.* 1305; *6.* 1081, 1113. On branches of *Picea* and *Larix.*
androgyna (Hoffm.) Arn.: *3.* 411, 419, 421. On moist, overhanging rock-walls.
tartarea (L.) Massal.: *10.* 890. On an exposed cliff.
sp.: *4.* 1426. On a moist, overhanging cliff.

Pachyospora

verrucosa (Ach.) Massal.: *10.* 774. Only in the uppermost parts (2335 m); on sunny ranker soil.

Pannaria

leucophaea (Vahl.) P. M. Jörg.: *10.* 815. On a sunny rock-wall.

Parmelia

disjuncta Erichs.: *4.* 668, 674, 675; *10.* 875, 880, 939. On cliffs.

exasperatula Nyl.: *4.* 553, 639; *6.* 1076. On branches of *Picea* and *Larix.*

glabratula (Lamy) Nyl. var. *fuliginosa* (Fr.) Grumm.: *3.* 408, 450; *4.* 658, 678, 679; *5.* 1244, 1272; *6.* 1136. Mainly on shady rock-walls, noted also on a trunk of *Picea.*

var. *glabratula: 5.* 1222. Only on SE slope (at 1560 m), on trunk of Picea.

loxodes Nyl.: *10.* 894. On an exposed rock-wall.

omphalodes (L.) Ach. ssp. *omphalodes. 4.* 681. On overhanging rock-wall.

spp. *pinnatifida* (Kurok.) Skult (see SKULT, 1984). *2.* 1188; *3.* 407, 418; *4.* 550, 660, 675, 1423, 1433. Mainly on moist-wet, overhanging rock-walls.

saxatilis (L.) Ach.: *2.* 1155, 1189, 1216; *3.* 410, 412, 423, 425, 501; *4.* 582, 597, 622, 649, 652, 695, 1409, 1427, 1434; *4.* 1263, 1268, 1315; *6.* 1083, 1095, 1148; *9.* 170; *10.* 778, 869, 888, 898. On rock (also seepages), trunk of *Larix* as well as on rotten stumps and humus.

squarrosa Hale: *3.* 413, 414, 415. On a sheltered, overhanging rock-wall. *P. squarrosa* is mainly distributed to eastern and western North America and to eastern Asia (see HYVÖNEN, 1985; in press).

stygia (L.) Ach.: *9.* 151. On a sunexposed cliff.

sulcata Tayl.: *2.* 1156, 1164; *3.* 494; *4.* 1379, 1450; *5.* 1224, 1243; *6.* 1114. On bark of conifers.

Parmeliopsis

aleurites (Ach.) Nyl.: *4.* 574, 580, 1366, 1389, 1395. On branches of *Larix* and *Pinus.*

ambigua (Wulf.) Nyl.: *2.* 1150, 1179; *3.* 436, 458, 498, 508; *4.* 551, 557, 601, 643, 646, 699, 1358, 1435; *5.* 1240, 1285; *6.* 1118; *9.* 178, 190; *10.* 766, 803, 931. On bark of conifers, rotten logs and stumps, sometimes also on overhanging cliffs.

hyperopta (Ach.) Arn.: *2.* 1155, 1179; *3.* 396, 458, 531; *4.* 559, 638, 646, 699, 1334; *5.* 1241; *6.* 1116. Most often on rotten wood, also on tree trunks.

Peltigera

aphthosa (L.) Willd.: *7.* 313, 368; *8.* 956, 959, 964; *10.* 817, 951. In mesic habitats; especially on humus of sheltered sides of hummocks (under scrub).

canina (L.) Willd.: *2.* 1203; *6.* 1054. On mossy cliffs.

degenii Gyeln.: *3.* 394, 488; *5.* 1231, 1314. On mosses of shady cliffs and rotten roots, on humus under scrub.

malacea (Ach.) Funck.: *7.* 292, 320, 375; *9.* 154, 157, 184, 216; *10.* 747, 831, 849, 864. On mosses of trampled hummocks as well as on ranker soil.

neckeri Müll. Arg.: *2.* 1212. On humus of a sheltered rock-wall.

polydactyla (Neck.) Hoffm.: *1.* 1000, 1007; *2.* 1198; *3.* 400. On vertical and overhanging mossy cliffs; also on humus and sandy soil.

praetextata (Sommerf.) Zopf: *1.* 1101; *2.* 1177, 1199, 1202, 1206, 1211, 1213; *3.* 546; *5.* 1232, 1264, 1266; *6.* 1126; *7.* 325; *9.* 182; *10.* 810. On mossy cliffs (dry surfaces or seepages), noted also on a rotten, mossy root.
rufescens (Weiss) Humb.: *1.* 1001, 1011; *6.* 1082, 1085; *7.* 350; *10.* 788. On sunny humus and sandy soil.
spuria (Ach.) DC.: *1.* 977; *7.* 319; *9.* 221, 230. On humus and mosses.

Pertusaria

corallina (L.) Arn.: *4.* 719, 1417. Saxicolous, on rock-walls.
isidioides (Schaer.) Arn.: *4.* 720. Saxicolous, on sheltered rock-walls.
lactea (L.) Arn.: *4.* 721; *6.* 1106. Saxicolous, on rock-walls.
spp.: eight specimens. On vertical to overhanging cliffs, on trunk of *Larix.*

Phaeophyscia

endococcina (Koerb.) Moberg: *3.* 481; *9.* 218. On sunny cliffs.

Physcia

caesia (Hoffm.) Fürnrohr: *4.* 666, 667, 680; *6.* 1100, 1137; *10.* 837, 875, 900. On rock.
dubia (Hoffm.) Lettau: *1.* 972, 982; *7.* 336, 346, 355; *9.* 169; *10.* 785, 897. Mainly on sunny cliffs.

Platismatia

glauca (L.) W. Culb. & C. Culb.: *2.* 1180. A poor specimen on a dying trunk of *Larix* (1830 m). Common in many other parts of the Alps (FREY, 1952).

Porpidia (see HERTEL, 1984)

crustulata (Ach.) Hertel & Knoph: *9.* 128. On a sunny cliff.
macrocarpa (DC.) Hertel & Schwab: *4.* 615; *10.* 824, 843. On moist bases of cliffs and on stones in running water.
tuberculosa (Sm.) Hertel & Knoph: *4.* 608, 614, 725; *5.* 1276; *10.* 861. On stones of a brook as well as on vertical, moist rock-walls.
spp.: 14 specimens. On sunny rock.

Protoparmelia

badia (Hoffm.) Hafellner (see HAFELLNER, 1984): *3.* 515, 526; *4.* 613, 697; *5.* 1274, 1275; *7.* 290, 347, 359, 360; *9.* 109, 114, 202, 256; *10.* 782, 844, 847, 848, 872. Especially on exposed rock.

Pseudephebe

minuscula (Arn.) Brodo & Hawksw.: *1.* 1020; *3.* 630; *10.* 795, 860, 884, 899. On exposed cliffs.
pubescens (L.) Choisy: *10.* 898. On a rock-wall.

Pseudevernia

furfuracea (L.) Zopf: *2.* 1149; *3.* 453, 455, 538; *4.* 560, 604, 634, 1317, 1319, 1365, 1378; *5.* 1219, 1227, 1237, 1242, 1271, 1295; *6.* 1065, 1139; *9.* 195, 196, 197; *10.* 878. On bark of conifers and on rotten stumps, noted also on ranker soil.

Psoroma

hypnorum (Vahl.) S. F. Gray: *1.* 1010; *4.* 651, 1400, 1407; *5.* 1301; *9.* 206, 209, 243; *10.* 947. On humus and branches of *Juniperus.*

Ramalina

capitata (Ach.) Nyl.: *10.* 893. On a exposed, high rock-wall.

pollinaria (Westr.) Ach.: *4.* 659, 1432; *5.* 1312; *10.* 875, 886, 887. Especially on moist overhangs, more rarely on sunny cliffs, and on trunk of *Picea.*

Rhizocarpon

geographicum (L.) DC.: *1.* 970, 981, 1013, 1014, 1015, 1018; *3.* 471, 472, 473, 475, 476, 517, 519, 520; *4.* 609, 610, 612, 628, 722; *5.* 1252, 1258, 1273, 1275, 1276; *6.* 1059, 1060, 1102; *7.* 262, 289, 345, 361; *9.* 104, 107, 108, 113, 114, 125, 132, 138, 203, 204, 222, 232, 234, 236, 245, 259; *10.* 781, 784, 804, 828, 829, 847, 942, 944, 948. On sunny rock.

spp.: 17 specimens. On cliffs and boulders.

Rhizoplaca

chrysoleuca (Sm.) Zopf: *10.* 903. On a high rock-wall.

melanophthalma (DC.) Leuckert & Poelt: *10.* 895. On a high rock-wall.

Rinodina

mniaraea (Ach.) Koerb.: *9.* 212. On humus.

spp.: six specimens. On cliffs and on branches of *Sorbus* and *Larix.*

Saccomorpha

uliginosa (Schrad.) Hafellner (see HAFELLNER, 1984). *5.* 1311. On cliff.

Scoliciosporum

chlorococcum (Stenhammar) Vězda: *3.* 497; *6.* 1066. In shady spruce stands, on branches of *Picea.*

Solorina

crocea (L.) Ach.: *10.* 811, 816. On the uppermost parts; on humus and mosses.

Stereocaulon

alpinum Laur.: *1.* 973, *979,* 980, 983, 986, 987, 994, 996, 998, 1002, 1003, 1005, 1009, 1025, 1028, 1030, 1031, 1035, 1036; *4.* 1405. On sunny cliffs, humus, gravel and sand.

nanodes Tuck.: *1.* 1023, 1032, 1041. On cliffs and sand.

Tephromela

atra (Huds.) Hafellner (see HAFELLNER, 1984). *10.* 780, 784. On sunny cliffs.

Thamnolia

vermicularis (Sw.) Schaer. var. *subuliformis* (Ehrh.) Schaer.: *10.* 769, 904. On sunny humus.

var. *vermicularis: 9.* 160, 176; *10.* 768, 774, 836. On humus of cliffs and hummocks.

Trapelia

coarctata (Sm.) Choisy: *1.* 1038. On a stone.

Trapeliopsis

granulosa (Hoffm.) H. T. Lumbsch (see HERTEL, 1984): *3.* 482, 511; *4.* 586, 664, 711, 1347, 1362; *7.* 331, 376; *9.* 156; *10.* 773a, 792, 855. Mainly on ranker soil and hummocks, also on mosses of rock-walls and rotten logs.

Umbilicaria

cinereorufescens (Schaer.) Frey: *4.* 626, 682, 1424; *10.* 885, 889, 940. Both on exposed and sheltered cliffs.

cylindrica (L.) Duby.: *1.* 1016, 1019; *3.* 514; *4.* 623, 655, 1327, 1402; *5.* 1459; *6.* 1091; *7.* 356; *9.* 104, 150, 181, 231, 233; *10.* 777, 840, 858, 859, 971, 875, 876, 883, 892, 935. On cliffs and rock-walls.

deusta (L.) Baumg.: *4.* 1399, 1412, 1414; *5.* 1278, 1460; *6.* 1058, 1098, 1144; *7.* 288, 357; *9.* 152, 167, 248; *10.* 806, 814, 839. On cliffs and rock-walls.

hyperborea (Ach.) Hoffm.: *4.* 1401. On a shady rock-wall.

leiocarpa DC.: *10.* 1453. On an exposed rock-wall.

nylanderiana (Zahlbr.) H. Magn.: *10.* 882, 1454. On a exposed rock-wall.

polyphylla (L.) Baumg.: *3.* 513; *4.* 696, 1432; *10.* 873. Both on sunny and sheltered cliffs.

vellea (L.) Ach.: *4.* 648, 673; *5.* 1269; *6.* 1090. On cliffs and ranker soil.

spp.: two specimens. On a cliff and ranker soil.

Usnea

filipendula Stirt.: *3.* 466; *4.* 598, 631; *5.* 1308. On branches of *Picea* and *Pinus.*

lapponica Vain.: *3.* 466, 535; *4.* 598, 605, 1318, 1386, 1393; *5.* 1292. On bark of conifers.

hirta (L.) Web.: *5.* 1220, 1228; *9.* 187. On branches of *Picea* and on rotten stump.

scabrata Nyl.: *2.* 1165; *4.* 605, 1394; *5.* 1307; *6.* 1112. On bark of conifers.

spp.: 30 specimens. On bark of trees and on rotten stump.

Varicellaria

rhodocarpa (Koerb.) Th. Fr.: *10.* 775. On sunny ranker soil.

Xanthoria

candelaria (L.) Th. Fr.: *10.* 897, 902. On an exposed cliff.

elegans (Link) Th. Fr.: *1.* 971; *2.* 1208; *10.* 784, 881, 886, 896. Especially on sunny cliffs.

sorediata (Vain.) Poelt: *10.* 837. On the top of a cliff, along with *Physcia caesia.*

List of bryophyte species

A. HEPATICAE

Anastrophyllum

minutum (Schreb.) Schust.: *3.* 553, 554; *4.* (763), 780, (791), 797, 1615. On shady, vertical rock-faces.

Apometzgeria

pubescens (Schrank.) Kuwah.: *3.* 559, 565, 583. On a shady, vertical cliff.

Barbilophozia

barbata (Schreb.). Loeske: *2.* 1451; *5.* 1573. On humus in partial shade.

floerkei (Web. & Mohr) Loeske: *4.* 823, 826, 1612, 1682; *7.* 411. *(B.* cf. *lycopodioides),* 450, 507; *8.* 1056; *10.* 863 *(B. cf. lycopodioides),* 923. On raw humus both on open and shaded localities often with *B. lycopodiodes* accompanied by the dominants of the sites, e.g. *Pleurozium schreberi* and *Dicranum scoparium.*

hatcheri (Evans) Loeske: *1.* 1232; *2.* 1414, 1423, 1440, 1461, 1464, 1471, 1479; *3.* 525, 560, 576, 577; *4.* 735, 769, 808, 1622, 1640, (1646), 1648, 1673, 1679; *5.* 1489, 1494, 1498, 1511, 1512, 1529, 1548 *(Plagiochila porelloides),* 1552; *6.* 1273, 1274, 1288, 1296 *(Cephalozia bicuspidata),* 1302, 1311 *(Lophocolea heterophylla),* 1335, 1340, 1347, 1359, 1380, 1391 *(Lophozia wenzelii); 7.* 390, (394), 395, 442, 506; *8.* 1065; *9.* 246, 251, 252, 277, 321, 348, 370; *10.* 922, 937, 1024 *(Tritomaria quinquedentata),* 1045. Very common. Usually on humus in partial shade but also on moist, shady and dry, open sites on humus and rocks. Accompanied often by e.g. *Lophozia ventricosa, Plagiochila porelloides, Dicranum scoparium* and *Pterigynandrum filiforme.*

lycopodioides (Wallr.) Loeske: *3.* 603; *4.* 714, 729, 786, 822, 1629, 1632; *5.* 1569, 1577; *7.* (411), 420, 436, 505; *9.* 307, 367; *10.* (863), 878, 924, 953, 1039. Fairly common on mesic, shady habitats, on humus and cliffs. In Aletschwald abundant under scrub. Accompanied by *B. floerkei, Dicranum scoparium* and *Sanionia uncinata.*

Bazzania

tricrenata (Wahlenb.) Lindb.: *4.* (710) *(Calypogeia integristipula); 10.* 1017. On mesic, shady sites on a rock and sand.

Blasia

pusilla L. : *1.* 1180. On moist, open till.

Blepharostoma

trichophyllum (L.) Dum.: *3.* 525 *(Barbilophozia hatcheri),* 531, 557, 562, 608, 638, 644; *4.* 796 *(Plagiochila porelloides),* 846, 1668; *10.* 941. On different substrates in moist and shady localities.

Calypogeia

integristipula Steph.: *3.* 517, 528, 657; *4.* 704, 710, 725, 730 *(Diplophyllum taxifolium),* 1659. On moist and shady sites growing on different substrates.

azurea Stotler and Crotz: *7.* 422. On moist humus under scrub.

Cephalozia

bicuspidata (L.) Dum.: *2.* (1415); *4.* (752); *5.* 1582, 1585, 1593; *6.* 1296; *7.* 451. On shady humus.

cf. *lunulifolia* (Dum.) Dum.: *4.* 1660. On rotten wood in a moist and shady habitat.

spp.: two specimens. On rotten wood.

Chiloscyphus

pallescens (Hoffm.) Dum.: *4.* 833. On wet peat.

Diplophyllum

taxifolium (Wahlenb.) Dum.: *3.* 532, 644; *4.* 716, 726, 730, 1664, 1667; *10.* 941, 995, 1026. On shady, moist cliffs and on humus.

Gymnomitrion

corallioides Nees: *10.* 951. In a hole between boulders.

Jungermannia

sphaerocarpa Hook.: *1.* 1139, 1156, 1161 (*Scapania helvetica),* 1264; *4.* 845; *7.* 476. In wet habitats.

Lepidozia

reptans (L.) Dum.: *4.* 700, 1681. On a stump of *Pinus cembra* and on an open cliff.

Lophocolea

bidentata (L.) Dum.: *7.* 494. On shady, mesic humus.

heterophylla (Schrad.) Dum.: *2.* 1413, 1422, 1460; *3.* 601, 645; *5.* 1567, (1579); *6.* 1306, 1311; *7.* 421. On mesic, partially shaded humus and rotten wood accompanied by *Heterocladium dimorphum* and *Barbilophozia hatcheri.*

minor Nees: *2.* 1409, 1427; *6.* 1317, 1388; *9.* 292, 347, 363. On moist soil and rotten wood.

Lophozia

incisa (Schrad.) Dum.: *3.* 654; *4.* 815, 858; *6.* 1316. On mesic, shady trunks and rocks.

longiflora (Nees) Schiffn.: *2.* 1418; *3.* 527, 648; *4.* 679, 1603, 1609. On moist, rotten wood.

obtusa (Lindb.) Evans: *4.* 666, 1607; *5.* 1521, 1548 *(Plagiochila porelloides).* On mesic, shady humus.

ventricosa (Dicks.) Dum.: *1.* (1231); *2.* 1410, 1468; *3.* 550, 554 *(Anastrophyllum minutum); 4.* (724), (838), 858 *(L. incisa),* 1614, 1622 *(Barbilophozia hatcheri),* (1643), 1645; *5.* (1515), (1572); *6.* 1289, 1307, 1346, 1385, 1393; *7.* (404), (418), 460, 461; *9.* 345; *10.* (862), 879, 933, 961, 1000, 1023, 1035. Both on open and shady places on different substrates. Quite often with *Barbilophozia hatcheri.*

wenzelii (Nees) Steph.: *1.* 1155, (1165), (1189); *4.* (690); *6.* 1391; *10.* (881), (959), (996). Both in open and partially shaded habitats.

sp.: one specimen. On humus.

Marchantia

alpestris (Nees) Burgeff: *3.* 626; *10.* 1019. On moist soil and humus.

Marsupella

cf. *sparsifolia* (Lindb.) Dum.: *7.* 405, 467. On open, dry humus.

sp.: one specimen.In a hole þetween boulders.

Pellia

sp. 3. 623, 634 *(Plagiochila porelloides); 4.* 727, 1666. On wet soil.

Plagiochila

asplenioides (L.) Dum.: *3.* 590, 634; *5.* 1520. On mesic humus.

porelloides (Nees) Lindenb.: *1.* 1188; *2.* 1412; *3.* 526, 552, 606; *4.* 773, 796; *5.* 1510, 1516, 1525, 1528, 1548; *6.* 1301. In mesic, shady habitats often with *Sanionia uncinata* and *Barbilophozia hatcheri.* Was not found above the timberline.

Pleuroclada

albescens (Hook.) Spruce: *1.* 1179. On a moist, open sandridge.

Porella

cordaeana (Hüb.) Moore: *2.* 1441, 1452, 1470, 1472; *5.* 1539, 1555. On mesic, shady rock-faces.

Preissia

quadrata (Scop.) Nees: *1.* 1138. On shady, wet sand by a brook. As a calciphilous species occurs only on the lateral moraine.

Ptilidium

pulcherrimum (G. Web.) Vain.: *2.* 1421. On mesic rotten wood in partial shade.

Radula

complanata coll. (incl. *R. lindenbergiana* Hartm. f.): *2.* 1408; *5.* 1538; *6.* 1275, 1361; *7.* 382, 413; *9.* 346, 349. On several substrates, both on mesic and dry sites.

Scapania

helvetica Gott.: *1.* 1161. In partial shade by a brook, on mesic humus.
subalpina (Lindenb.) Dum.: *3.* 628. On wet, shady soil by a brook.
sp.: 4. 812. On wet soil by a brook.

Tritomaria

polita (Nees) Joerg.: *1.* 1206. On sand in a small brook.
cuinquedentata (Huds.) Buch: *10.* 1024. In a moist hole between boulders.

B. MUSCI

Andreaea

rupestris Hedw.: *4,* 765, 789, 1617; *7.* 404 *(Lophozia* cf. ventricosa); *10.* 1022. On rocks and cliffs.

Anisothecium

palustre (Dicks.) I. Hag.: *4.* 843. On peat.

Anomobryum

julaceum (Gaertn. et al.) Schimp.: *1.* 1070, 1108. On sand and on a wet cliff.

Aongstroemia

longipes (Sommerf.) B.S.G.: *1.* 1172, 1176. On gravel in a brook bed.

Aulacomnium

palustre (Hedw.) Schwaegr.: *4.* 831; *7.* 426, 430, 446, 449, 489; *10.* 1040. On moist peat and humus.

Bartramia

halleriana Hedw.: *3.* 545; *4.* 749, 1676. On rock-faces in deep shade.
ithyphylla Brid.: *1.* 1088, 1251; *3.* 551; *4.* 776, 819, 1669; *6.* 1321; *7.* 459; *9.* 245, 327, 373; *10.* 867, 940, 994, 1034. Usually in shade on moist cliffs but also on humus both on shady and open sites.

Blindia

acuta (Hedw.) B.S.G.: *4.* 795, 799. On moist, shady cliff.

Brachythecium

albicans (Hedw.) B.S.G.: *1.* 1092, 1110; *2.* 1454, 1473; *6.* 1375, 1390; *9.* 265, 294, 344; *10.* (893). Predominantly on mesic humus in partial shade but also on gravel and cliff.
collinum (C. Müll.) B.S.G.: *1.* 1090; *4.* 755, 804; *7.* 443; *9.* 295; *10.* 915, (993). On humus and cliffs, both in moist and dry habitats.

erythrorrhizon B.S.G.: *4.* (664); *7.* 417. On cliffs.
cf. *glaciale* B.S.G.: *10.* 896. On ranker soil.
cf. *latifolium* Kindb.: *4.* 721, 811. In a brook bed, on a stone and soil.
mildeanum (Schimp.) Schimp.: *4.* 835. On open, wet peat.
oedipodium (Mitt.) Jaeg.: *4.* 741; *6.* 1286; *9.* 336; *10.* (949); *11.* 1699. On mesic, shady humus.
plumosum (Hedw.) B.S.G.: *1.* 1133. On moist sand in a brook bed.
populeum (Hedw.) B.S.G.: *1.* (1100), 1210; *9.* 328. On open cliffs.
reflexum (Starke) B.S.G.: *1.* 1200, 1233, 1255; *3.* 524, (572), 573, 593, 621, 643; *4.* 673, 674, 687, 691, 709, 753, 785, 859, 860, 1610, 1635, 1647, 1655; *5.* 1565, 1581; *6.* 1387; *7.* (383), 409, 490, 503; *8.* 1059; *9.* 339, (342), 358, 371; *10.* 887, 990. In mesic, shady habitats, on humus, soil and rotten wood.
salebrosum (Web. & Mohr) B.S.G.: *1.* (1147), 1214, 1216; *3.* 578, 646; *4.* 675, 683, 706, 754, 821; *5.* 1500, 1506, 1518, 1570, 1595; *6.* 1377, (1397); *7.* 427; *9.* 337. On mesic and shady sites, usually growing on humus or soil but also on rotten wood and boulders.
starkei (Brid.) B.S.G.: *1.* 1192; *2.* 1442; *3.* 556, 574, 594, 600, 637, 655; *4.* 668, 671, 678, 684, 695, 707, 737, 1604; *6.* 1276, 1284, 1290, 1304, 1367; *9.* 299, 325; *10.* 1037. In mesic, shady habitats growing on humus, rotten wood or rock.
trachypodium (Brid.) B.S.G.: *1.* 1150, 1202; *4.* 750; *5.* 1534; *7.* 396; *9.* 257, 276, 284, 286, 309, 312. Predominantly on mesic, shady humus.
velutinum (Hedw.) B.S.G.: *2.* 1402, 1406, 1426, 1433, 1435; *4.* 670; *5.* 1491, 1493, 1507, (1551), 1559, 1580, 1596, 1599; *6.* 1299, 1355, (1370); *7.* (488); *10.* 906. On mesic shady sites, on humus and rotten wood.

Bryoerythrophyllum

recurvirostre (Hedw.) Chen.: *1.* (1082), 1239, (1259); *7.* 458. On open, both relatively dry and mesic sites, growing on gravel and humus.

Bryum

arcticum (R. Brown) B.S.G.: *1.* 1167. An oroarctic, calciphilous species growing here on partially shaded, moist gravel.
argenteum Hedw.: *6.* 1353; *9.* 279; *10.* 1007. On dry humus.
caespiticium Hedw.: *1.* 1083, 1106, 1111, 1130, 1143, 1238; *7.* 468; *9.* 280, 304, 315, 322, 353, 360; *10.* 904. Only in open habitats, was not found at all in the forests. Both on sunny, dry and mesic sites, on humus and gravel.
capillare Hedw.: *3.* 558; *5.* 1499; *9.* 314. In shade, on mesic humus and a cliff.
creberrimum Tayl.: *1.* 1087; *3.* (656). In partial shade, on mesic gravel and rotten wood.
elegans Brid.: *2.* 1458. In partial shade, on ranker soil.
flaccidum Brid.: *3.* 586; *4.* 744, 747, 758, 1678; *5.* 1531, 1536. On mesic, shady cliffs.
muehlenbeckii B.S.G.: *7.* 466, 478. On sunny, but still moist humus and a cliff.
pallescens Schwaegr.: *1.* 1145. On wet gravel.
pseudotriquetrum (Hedw.) Gaertn. et al.: *1.* 1136, 1158, 1175, 1197, 1205, 1217, 1242; *4.* 794. In wet, shaded and partially shaded habitats, on gravel and humus, often by a brook. Accompanied by *Cratoneuron commutatum, Philonotis tomentella* and *Sanionia uncinata.*
schleicheri Lam. & DC.: *1.* 1114. On mesic till.

stenotrichum C. Müll.: *1.* 1185. On wet, open gravel.
stirtonii Schimp.: *5.* 1504, 1532; *6.* 1318, 1339. On mesic, shaded cliffs and humus.
turbinatum (Hedw.) Turn.: *1.* 1103, 1162. On a wet cliff and on gravel by a brook.

Calliergon

stramineum (Brid.) Kindb.: *4.* 810, 828; *11.* 1695. On peat and on wet soil by a brook.

Campylium

cf. *chrysophyllum* (Brid.) J. Lange: *1.* 1135. On wet sand in a brook bed. A calciphilous species.
stellatum (Hedw.). C. Jens.: *1.* 1219, 1250. On moist humus.

Ceratodon

purpureus (Hedw.) Brid.: *1.* 1067, 1080, 1098, 1116; *2.* 1399, 1481; *3.* 616; *4.* 770, 788, 854; *5.* 1502, 1513, 1549, 1561, 1576; *6.* 1323, 1329, 1331, 1336, 1343, 1348, 1356, 1392; *7.* 391, 437, 440, 464, 469, 497, 509; *9.* 239, 249, 250, 264, 269, 282, 323, 333, 338; *10.* 969; (1006). Predominantly on open sites, on humus, sand etc., with e.g. *Desmatodon latifolius, Pohlia nutans* and *Polytrichum juniperinum.*

Cirriphyllum

piliferum (Hedw.) Grout: *5.* 1523. On mesic humus.

Cratoneuron

commutatum (Hedw.) G. Roth: *1.* 1151, 1160, 1174, 1208. On wet gravel and humus by brooks.
filicinum (Hedw.) Spruce: *1.* 1157. By a brook on moist humus.

Cynodontium

fallax Limpr.: *3.* 547, (622); *4.* 792. Both in mesic, shady habitats and on an open, dry cliff.
gracilescens (Web. and Mohr) Schimp.: *4.* 745, 748. On a shady, mesic rock-face.
polycarpon (Hedw.) Schimp.: *4.* 762, 1685. On mesic, shady cliffs.
strumiferum (Hedw.) Lindb.: *1.* 1209. On moist, shady gravel.

Desmatodon

latifolius (Hedw.) Brid.: *2.* 1478; *6.* 1349, 1351, 1357; *7.* 393, 438, 496, 502; *9.* 241, 263, 289, 290, 291, 305, 366; *10.* 870, 894, 898, 902, 917, 987, 1031. Usually on open sites, on dry humus.

Dicranella

subulata (Hedw.) Schimp.: *1.* 1169; *7.* 484. On sand and gravely soil, in mesic, shady habitats.
spp.: 1. 1266; *5.* 1590. On humus and sand, on mesic shady sites.

Dicranoweisia

crispula (Hedw.) Milde: *1.* 1074, 1095, 1107, 1125, 1211, 1230; *2.* 1446, 1469; *3.* 538, 568, 580; *4.* 662, 715, 818, 1616, 1633; *5.* 1553; *6.* 1280, 1298, 1334; *7.* 462; *9.* 297; *10.* 873, 948, 952, 956, 964, 998, 1003. Predominantly on shady and semi-shaded rocks and cliffs.

Dicranum

elongatum Schwaegr.: *1.* 1148. On mesic gravel between boulders.

fuscescens Turn.: *3.* 555; *4.* 778, 1619, 1621; *8.* 1053, 1058; *10.* 946. On mesic raw humus but also on cliffs.

muehlenbeckii B.S.G.: *7.* 412, 429, 441; *8.* 1051; *9.* 329, 334; *10.* 880, 897, 935, 975, 1010. Often with *D. scoparium* on dry humus near the timberline.

scoparium Hedw.: *1.* 1235, (1246), 1249; *2.* 1416, 1420, 1424, 1480; *3.* 523, 537, 598, 619, 639, 653; *4.* 672, 676, 682, 731, 739, 805, 824, 848, 1601, 1602, 1611, 1626, 1630, 1631, 1634, 1637; *5.* 1495, 1547, 1550, 1578, 1587; *6.* 1277, 1283, 1287, 1308, 1345, 1371, 1378, 1386; *7.* 392, 401, 407, 419, (470), 485, 492, 504, (511), 513; *8.* 1052, 1060, 1063, 1064; *9.* 253, 254, 258, 260, 293, 298, 300; *10.* 866, 872, 883, 884, 885, 899, 934, 977, 978, 1001, 1008, 1028. Very common. Mostly found on shady and partially shaded raw humus, but occurs also on rotten wood, boulders and cliffs. One of the dominants in Aletschwald, but on the lateral moraine, restricted to the young forests on the upper slopes. Usually with e.g. *Hylocomium splendens, Pleurozium schreberi, Polytrichastrum alpinum* and *Mnium spinulosum.*

Distichium

capillaceum (Hedw.) B.S.G.: *1.* 1072, 1081, 1120, 1186, 1191, 1225, 1229; *4.* 757. On rocks and gravel, both on dry and moist sites.

Ditrichum

flexicaule (Schwaegr.) Hampe: *1.* 1127, 1132, 1247. As a calciphilous species, occurs only on the lateral moraine on relatively moist places.

Encalypta

affinis Hedw. f.: *4.* 768; *9.* 365. On vertical, dry rock-face.

Eurhynchium

pulchellum (Hedw.) Jenn.: *9.* 244, 247, 248. On a mesic, shady cliff.

Grimmia

anomala Hampe: *6.* 1394; *9.* 350. On cliffs.

curvata (Brid.) De Sloover: *4.* 719; *6.* 1364. On mesic, semishaded cliffs.

hartmanii Schimp.: *5.* 1584; *6.* 1272, 1281, 1292, 1373; *7.* 415, 472; *9.* 271, 272. Usually on shaded and partially shaded mesic boulders and cliffs.

montana B.S.G.: *5.* 1535; *6.* 1293, 1396; *9.* 266. On cliffs in partial shade.

muehlenbeckii Schimp.: *2.* 1457; *3.* 620; *6.* 1312, 1395. On cliffs in partial shade.

ovalis (Hedw.) Lindb.: *2.* 1462; *5.* 1554, 1563; *6.* (1313), 1324. Both on dry and moist rocks and cliffs.

sessitana De Not.: *1.* 1237; *4.* 856, 1618; *7.* 439; *9.* 311; *10.* 918. On dry, sunny cliffs and boulders.

torquata Grev.: *4.* 772. On vertical, shady rock-face.

sp.: 10. 973, 997. On cliff.

Herzogiella

striatella (Brid.) Iwats.: *7.* 380. On mesic, shady humus.

Heterocladium

dimorphum (Brid.) B.S.G.: *3.* 636; *4.* 728, 732, 801, 1620; *5.* 1492, 1501, 1526, 1533, 1541, 1583; *6.* 1300, 1309, 1369; *7.* 389, 410, 416, 444; *9.* 259, 283, 285, 326, 332, 341, 351, 352, 372; *10.* 877, 907, 909, 916, 986, 1015. Predominantly on humus, but occurs also on rotten wood and cliffs, both on shady and open sites.

Homalothecium

sericeum (Hedw.) B.S.G.: *1.* 1128; *2.* 1463, 1486. On mesic, shady cliffs.

Hylocomium

pyrenaicum (Spruce) Lindb.: *4.* 1665; *7.* 428, 447; *10.* 891, 1016, 1043. On mesic, raw humus.

splendens (Hedw.) B.S.G.: *1.* 1223, 1241; *2.* 1437; *3.* 521, 642; *4.* 696, 802, 851, 1605; *5.* 1524; *6.* 1269, 1344; *7.* 424, 456, 498; *8.* 1049, 1054; *9.* 296; *10.* 957, 962, 981, 1009. On mesic, raw humus, often with *Dicranum scoparium.* One of the characteristic species in Aletschwald, especially in the quite open upper part. On the lateral moraine only in young forests.

umbratum (Hedw.) B.S.G.: *4.* 850. On semishaded humus.

Hypnum

cupressiforme Hedw.: *2.* 1466, 1487; *3.* 543, 566, 618; *4.* 764, 777, 1677, 1684; *5.* 1508, 1517, (1594); *6.* 1325, 1333, 1398; *10.* 965. Predominantly in forests, usually on mesic, shady cliffs and boulders, but occurs also on rotten wood and humus.

Isothecium

alopecuroides (Dubois) Isov.: *2.* 1438; *3.* 542, 563, 604, 640; *4.* 771, 790. On shady, vertical rock-faces and boulders.

Kiaeria

starkei (Web. & Mohr) I. Hag.: *1.* 1134; *4.* 713; *10.* 865, (903), 936, 1014, 1041. On cliffs, dry humus and moist gravel.

Lescuraea

incurvata (Hedw.) Laet.: *1.* 1085, 1097, 1201; *2.* 1444, 1456, 1477; *3.* 535; *4.* 712, 783, 806, 1650, 1653; *5.* 1527, 1556, 1558, 1592; *6.* 1270, 1294, 1297, 1341; *9.* (278),

324; *10.* 871, 939, 991, 1042. Usually on partially shaded cliffs and boulders but also on humus and gravel.

mutabilis (Brid.) Lindb.: *7.* 385. On a rotten branch, in shade.

radicosa (Mitt.) Mönk.: *4.* 784, 1649, 1652, 1672; *9.* 340, 376; *10.* 889, (912), 919, 944, (1032). Often with *L. incurvata,* predominantly in shady habitats, but occurs also on dry sites.

saxicola (B.S.G.) Milde: *7.* 400, 457, 500; *9.* 313, 356; *10.* 932, 955, 983, 1002. Only under scrub above the timberline, usually on cliffs but also on rotten wood and humus.

Meesia

uliginosa Hedw.: *1.* 1168, 1218, 1224. On moist gravel and humus.

Mniobryum

wahlenbergii (Web. & Mohr) Jenn.: *1.* (1177); *5.* 1589. On wet sand and mesic humus.

vexans Limpr.: *1.* 1178; *7.* 452. On moist sand and mesic, shady humus.

Mnium

spinulosum B.S.G.: *2.* 1400; *3.* 591, 595, 597, 658, 661; *5.* 1488, 1543; *6.* 1285, 1366, 1368; *7.* 473; *9.* 308, 359, 361; *10.* 967. In mesic and moist habitats, on humus and soil. Charasteristic on needle litter of the densely shaded spruce stands in Riederwald and Rotbrüch.

stellare Hedw.: *2.* 1405; *3.* 519, 548, 584, 589, 632; *6.* 1389; *9.* 274. On shady, mesic and moist sites, growing on diverse substrates.

Oligotrichum

hercynicum (Hedw.) Lam. & DC.: *7.* 483. On vertical, sandy wall of a small hole.

Oncophorus

virens (Hedw.) Brid.: *1.* 1170, 1198, 1220, 1243. On moist and wet humus, accompanied often by *Sanionia uncinata.*

Orthodicranum

flagellare (Hedw.) Loeske: *4.* 1627 *(O. montanum).* On rotten wood.

montanum (Hedw.) Loeske: *4.* 699, 779, 781, 1627. On rotten wood.

tauricum (Sapehin) Z. Smirn.: *2.* 1401, 1447, 1467; *3.* 647, 651; *5.* 1544; *6.* 1376. Only in forests on rotten wood.

Orthotrichum

rupestre Schwaegr.: *2.* 1485; *4.* 743, (767). On vertical cliffs.

Oxystegus

tenuirostris (Hook. & Tayl.) A. J. E. Sm.: *9.* 273. In a shady fissure of a cliff.

Paraleucobryum

longifolium (Hedw.) Loeske: *3.* 536, 605; *4.* 733, 853; *5.* 1591; *6.* 1282; *9.* 306; *10.* 1018, 1046. Usually on shady cliffs and boulders but occurs also on dry sites.

Philonotis

seriata Mitt.: *4.* 836. On open peat.

tomentella Mol.: *1.* 1159, 1166, 1171, 1181, 1207. On wet gravel and humus, accompanied by *Bryum pseudotriquetrum* and *Cratoneuron commutatum.*

sp.: 1. 1104. On a wet, open cliff.

Plagiomnium

affine (Funck) T. Kop.: *5.* 1522. On moist humus in partial shade.

Plagiothecium

curvifolium Limpr.: *2.* 1425; *3.* 629; *4.* 681, 703, 1606; *7.* 480. On shady rotten wood and humus.

denticulatum (Hedw.) B.S.G.: *2.* 1404; *3.* 585, 596, 599, 635; *4.* 685, 717, 738, 1654, 1657; *5.* 1597; *6.* 1291, 1319, 1332; *7.* 425; *10.* 914, 920, 947, 1025. Usually in mesic, shady habitats, on humus, rocks and rotten wood.

laetum B.S.G.: *3.* 518, 607; *4.* 742, 1670. On mesic, shady humus and cliffs.

Pleurozium

schreberi (Brid.) Mitt.: *2.* 1453; *3.* 529; *4.* 677, 692, 849, 1608; *5.* 1502; *6.* 1379; *7.* 379, 387, 423, 453; *8.* 1048, 1055; *9.* 255, 362; *10.* 925, 931, 980, 1029. On raw humus. With *Dicranum scoparium* and *Hylocomium splendens,* one of the dominants in Aletschwald.

Pogonatum

urnigerum (Hedw.) P. Beauv.: *1.* 1115, 1256 *(Polytrichum piliferum),* 1262; *4.* 689, 817; *5.* 1514, 1560, 1598. Usually on bare sand or gravel, accompanied by *Ceratodon purpureus* and *Racomitrium canescens.*

Pohlia

cruda (Hedw.) Lindb.: *1.* 1228; *4.* 722, 1687; *10.* 945, 974, 999, 1004, 1021, 1044. On shady sites, on diverse substrates, e.g. cliff crevices, sand and humus.

drummondii (C. Müll.) Andr.: *4.* 807; *9.* 335, 374. On open ground.

elongata Hedw.: *4.* 698, 708, 798; *6.* 1314, 1352. On sand uncovered by fallen trunks, at base of cliffs and on humus.

filum (Schimp.) Mårt.: *1.* 1260, 1263, 1268. On open gravel.

longicollis (Hedw.) Lindb.: *3.* 516; *4.* 697, 740, 751, 756, 760, 787, 1686. On mesic shady sites, on humus and sand.

nutans (Hedw.) Lindb.: *1.* 1195; *2.* 1483; *3.* 569, 650; *4.* 688, 702, 825, 855, 857, 1642; *5.* 1574; *6.* 1327, 1354; *7.* (378), (384), 406, 414, 432, 434, 482, 508; *8.* 1057, 1062, 1066; *9.* 316, 320, 343; *10.* 882, (908), 910, 926, 966. Both in open, dry and mesic, partially shaded habitats, usually on humus, but also on sand, cliffs and rotten wood.

Polytrichastrum

alpinum (Hedw.) G. L. Sm.: *1.* 1227; *3.* 522, 544, 602, 617; *5.* 1497, 1542; *6.* 1278, 1305, 1363, 1372; *10.* 861, 890, 929, 938, 971. Usually on partially shaded and shaded sites on diverse substrates, one of the characteristic species of Riederwald, often with *Dicranum scoparium.*

longisetum (Brid.) G. L. Sm.: *4.* 839, 1674; *7.* 381, 454. In moist habitats on humus and peat.

Polytrichum

commune Hedw.: *10.* 875; *11.* 1702. On dry humus and peat.

juniperinum Hedw.: *1.* 1089, 1129, 1194; *2.* 1417, 1475; *3.* 539, 611, 630; *4.* 667, 686, 1625, 1636; *6.* 1295, 1381; *7.* 402, 495, 510; *8.* 1050, 1061; *9.* 240, 268, 281, 330, 355, 375; *10.* 905, 968, 976, 982, 985, 1011, 1030. On dry cliffs but also on humus, even on mesic sites. On ranker soil very common for example on Riederhorn. Often with *Desmatodon latifolius, Dicranum scoparium* and *Polytrichum piliferum.*

piliferum Hedw.: *1.* 1071, 1094, 1119, 1163, 1256; *3.* 549, 613; *4.* 803, 852, 1641; *6.* 1328, 1330, 1342, 1350, 1362; *7.* 386, 463, 479; *9.* 242, 270, 288; *10.* 864, 900, 984. On dry cliffs and boulders and on ranker soil with *Ceratodon purpureus, Desmatodon latifolius, P. juniperinum* and *Racomitrium canescens.*

Pterigynandrum

filiforme Hedw.: *2.* 1407, 1431, 1434, 1439, 1443, 1465; *3.* 561, 587, 609, 641; *4.* 736, 746, 766, 1683; *5.* 1490, 1496, 1537, 1540, 1600; *6.* 1320, 1360, 1365; *9.* 243; *10.* 972, 1027. On shady, mesic cliffs and boulders but also on humus and on fallen branches, often with *Barbilophozia hatcheri.*

Ptilium

crista-castrensis (Hedw.). De Not.: *4.* 711. On mesic, semishaded humus.

Racomitrium

canescens (Hedw.) Brid.: *1.* 1068, 1077, 1078, 1099, 1105, 1113, 1117, 1121, 1123, 1131, 1164, 1182, 1183, 1190, 1204, 1212, 1226, 1234, 1240, 1245, 1252, 1257, 1258, 1261, 1265, 1267; *2.* 1455, 1476; *3.* 534, 579, 612; *4.* 734, 800, 816, 1624, 1638, 1639, 1651; *5.* 1575; *6.* 1271, 1279, 1310; *7.* 397; *9.* 256, 261, 262, 287, 303, 310, 319, 377; *10.* 892, 895, 901, 942, 989, 1047. Very common and abundant species, in many kind of habitats, in shady, moist as also in open and dry ones. Grows on gravel, cliffs and humus.

elongatum (Ehrh.) Frisvoll: *7.* 399, 408, (431), 433, 435, 465, 493, 499, 515; *10.* 868, 927. Predominantly on mesic humus, on open and semishaded sites.

heterostichum (Hedw.) Brid.: *6.* 1322; *10.* 874. On dry and wet rock-faces.

sudeticum (Funck) B.S.G.: *1.* 1137; *3.* 615, 652; *4.* 718, 1623, 1680; *5.* 1546; *7.* 475; *10.* 928, 943, 970, 1033. On cliffs, both in the open and in shade.

Rhizomnium

magnifolium (Horik.) T. Kop.: *3.* 627; *4.* 809, 842, 1663. On wet peat, humus and soil.

pseudopunctatum (Bruch & Schimp.) T. Kop.: *4.* 834. On open, wet peat.

punctatum (Hedw.) T. Kop.: *3.* 592, 625, 633, 649. On moist, shady soil.

Rhodobryum

roseum (Hedw.) Limpr.: *7.* 491; *10.* 921. On mesic, partially shaded humus.

Rhytidiadelphus

loreus (Hedw.) Warnst.: *3.* 631. In partial shade, on moist soil.
squarrosus (Hedw.) Warnst.: *5.* 1588. On semishaded humus.
triquetrus (Hedw.) Warnst.: *2.* 1429, 1436; *3.* 520; *4.* 705, 1656; *5.* 1505, 1519; *7.* 388, 481; *9.* 275, 369; *10.* 992. On shaded, moist and mesic humus.

Sanionia

uncinata (Hedw.) Loeske: *1.* 1086, 1112, 1126, 1173, 1193, 1199, 1203, 1215, 1221, 1222, 1236, 1244, 1253; *2.* 1419, 1432, 1484; *3.* 530, 540, 546, 567, 570, 581, 582, 610, 614, 624, 659, 660; *4.* 663, 665, 669, 720, 761, 793, 820, 1661, 1662, 1671; *5.* 1545, 1557, 1564, 1566, 1571, 1586; *6.* 1303, 1358, 1384; *7.* 445, 448; *9.* 368; *10.* 869, 876, 886, 930, 979, 1005, 1038. In many kinds of habitats – from moist, shaded to open and dry, on diverse substrates, e.g. at base of trees, on cliffs, gravel and rotten wood.

Schistidium

apocarpum (Hedw.) B.S.G.: *1.* 1073, 1076, 1084, 1101, 1109, 1118, 1124, 1141, (1153); *7.* 398; *9.* 267, 317, 364. On dry and wet cliffs.

Schistostega

pennata (Hedw.) Web. & Mohr: *4.* 693. In a hole on bare sand uncovered by a fallen stump.

Sphagnum

angustifolium (Russow) C. Jens.: *11.* 1688 *(S. centrale)*, 1689, 1690, 1691, 1692 *(S. magellanicum)*, 1694, 1700, 1703, 1704, 1706. On peat, both on hummocks and hollows, one of the dominants on the Flesch mire.
centrale C. Jens.: *11.* 1688. On wet peat in partial shade.
compactum DC.: *7.* 474, 477, 487 *(S. nemoreum).* In wet depressions between scrub hummocks.
magellanicum Brid.: *11.* 1692, 1696. On wet peat between hummocks.
nemoreum Scop.: *7.* 403, 486, 487; *11.* 1697. On peat hummocks.
platyphyllum (Braith.) Warnst.: *4.* 813, 827 *(S. russowii),* 832, 840 *(S. centrale).* In a wet brook bed and on peat.
russowii Warnst.: *4.* 827, 829, 841. On wet shady peat.
subsecundum Nees: *11.* 1693, 1701, 1705, 1707. On wet peat, dominant species in the wet centre of the Flesch mire.
warnstorfii Russow: *4.* 814, 830, 1675. On wet peat and humus.

Tayloria

tenuis (With.) Schimp.: *2.* 1403; *3.* 571, 575. On humus and rotten wood.

Tetraphis

pellucida Hedw.: *2.* 1449; *4.* 680, 701, 782, 1658. On rotten wood.

Timmia

austriaca Hedw.: *3.* 533, 541, 564; *4.* 775; *10.* 1020. On mesic, shady cliffs.

Tortella

fragilis (Hook. & Wils.) Limpr.: *1.* 1184. On sunny, wet gravel.

inclinata (Hedw. f.) Limpr,: *1.* 1069, 1079, 1093, 1096, 1102, 1122, 1144, 1146, 1152. As a calciphilous species occurs only on cliffs and gravel of the lateral moraine. Often with *Schistidium apocarpum.*

tortuosa (Hedw.) Limpr.: *1.* 1075, 1142, 1154, 1187; *7.* 471; *10.* 913. Calciphilous species. Occurs only in open, mesic sites of the lateral moraine, on gravel and cliffs.

Tortula

norvegic (Web.) Lindb.: *1.* 1091, 1140, 1149, 1213, 1248, 1254; *7.* 501; *9.* 318; *10.* 911, 988. On diverse substrates, on cliffs, humus and gravel, both on open, dry as shady, mesic sites.

ruraliformis (Besch.) Grout: *2.* 1474; *3.* 588. On shady, mesic cliffs.

ruralis (Hedw.) Gaertn. et al.: *2.* 1428; *4.* 759; *5.* 1509; *6.* 1326, 1338; *9.* 354, 357; *10.* 888, 960, 1012. On shady, mesic humus, cliffs and boulders.

subulata Hedw.: *5.* 1530, 1562. On bare, sandy soil.

Warnstorfia

exannulata (B.S.G.) Loeske: *4.* 837, 844. On wet peat.

Weissia

spp.: *5.* 1568: *6.* 1315, 1337; *9.* 301. In partial shade, on sandy humus.

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ABSTRACT

Contributions to the lichen and bryophyte flora of Aletschwald nature reserve and its surroundings (Valais, Switzerland)

This study gives an account of the lichen and bryophyte flora of the Aletschwald Nature Reserve and its surroundings (Valais, Switzerland). Eleven localities in forests and above the present timberline were investigated, including the recent lateral moraine of the Great Aletsch Glacier. The collection sites with exception of the highest one at Mossfluo, are situated in the oroboreal (subalpine) zone. In total 1358 lichen and 1469 bryophyte specimens were collected. The number of lichen species amounts to 178 (53 of which are new for the area) and that of bryophyte species to 186, (58 of which are new for the area). All species are listed with a short description of the habitat. The terricolous and saxicolous lichen and bryophyte flora is quite uniform both in forests and above the present timberline. Only in the uppermost part of the site (Mossfluo) oroarctic (alpine) lichen species occur. The flora of the recent lateral moraine differs from that of the other sites by pioneer and calciphilous species. The lichens *Bryoria pseudofuscescens* (Gyeln.) Brodo & Hawksw., *Cladonia merochlorophaea* Asah., *C. merochlorophaea* var. *novochlorophaea* Sipman and the psoromic acid race of *C. symphycarpa* (Ach.) Fr. are recorded for the first time for Switzerland.

ZUSAMMENFASSUNG

Beiträge zur Flechten- und Moosflora der Aletschreservates und seiner näheren Umgebung (Wallis, Schweiz)

Der vorliegenden Mitteilung ist ein Beitrag zur Flechten und Moosflora des Aletschwald Naturreservates und Umgebung (Wallis, Schweiz). Elf Stationen, in Wälder wie auch über der heutigen Waldgrenze, wurden inventarisiert, wovon auch eine auf der rezenten Seitenmoräne des grossen Aletschgletschers. Mit Ausnahme von der höchstgelegenen Mossfluo, befunden die Stationen sich in der oroborealen (subalpinen) Vegetationsstufe. Das gesammelte enthalt 1358 Flechten-und 1469 Moosproben. 178 Flechtenarten sind gefunden (53 neue für das Gebiet) und 186 Moosenarten (58 neue für das Gebiet). Alle Proben sind im Artenverzeichnis enthalten mit einer kurzen Beschreibung von den Fundorten. Die Flechten- und Moosflora von Wald und oberhalb der heutigen Waldgrenze sind ziemlich gleich. Nur in dem höchstgelegenen Standort (Mossfluo) wurden oroarktische (alpine) Flechten gesammelt. Die junge Seitemorene unterscheidet sich von den anderen Stationen durch eine Flora mit kalkliebenden Arten und Pionierarten. Die Flechtenarten *Bryoria pseudofuscescens* (Gyeln.) Brodo & Hawksw., *Cladonia merochlorophaea* Asah., *C. merochlorophaea* var *novochlorophaea* Sipman und die Psoromsäurerasse von *C. symphycarpa* (Arch.) Fr. werden zum ersten Mal für die Schweiz nachgewiesen.

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